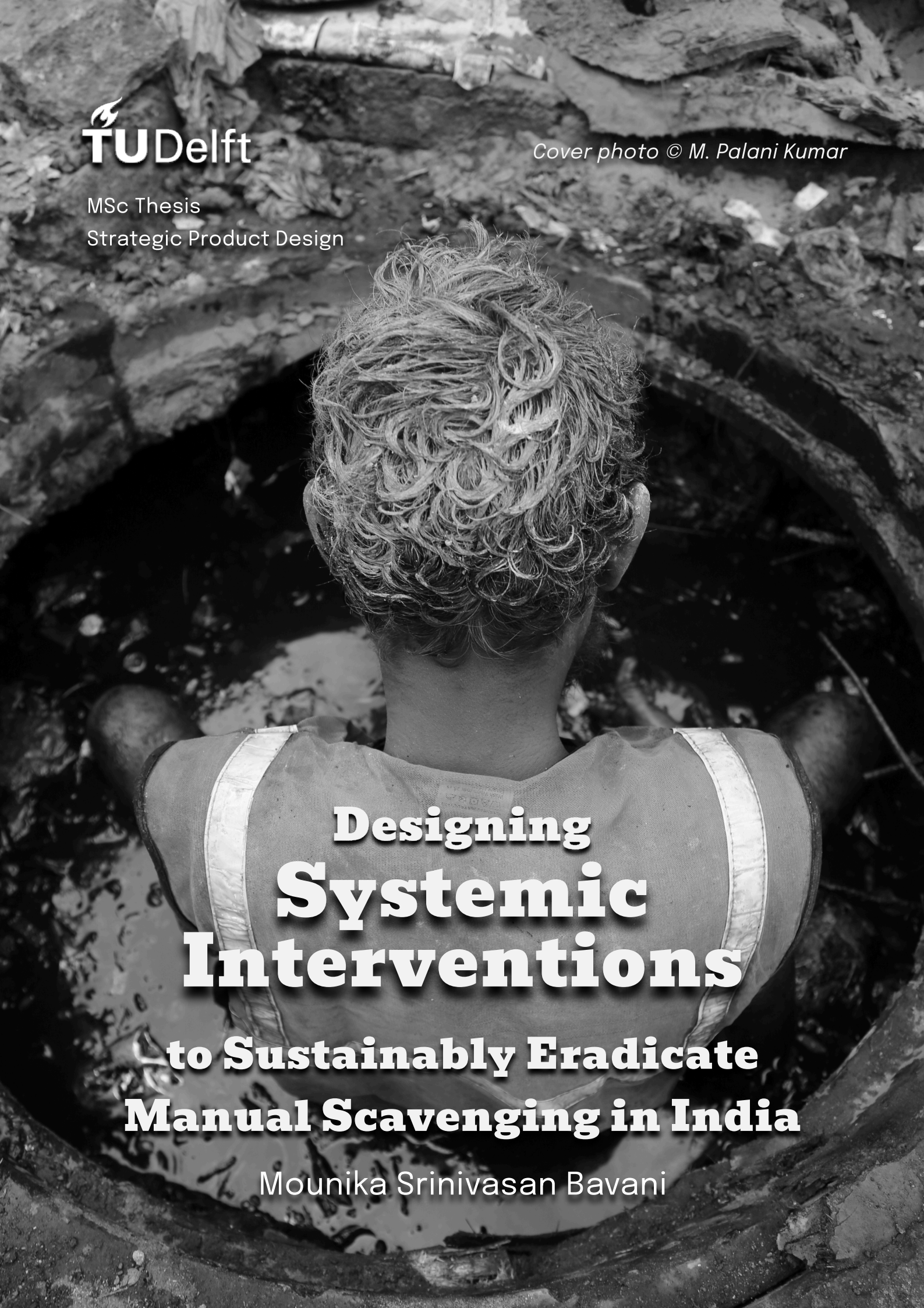


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MSc Thesis
Strategic Product Design

Designing Systemic Interventions to Sustainably Eradicate Manual Scavenging in India

Mounika Srinivasan Bavani

Designing Systemic Interventions to Sustainably Eradicate Manual Scavenging in India

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“For ours is a battle not for
wealth or for power.
It is a battle for freedom.
It is the battle of reclamation
of human personality.”

-Dr. B.R. Ambedkar

Acknowledgements

This thesis stands on the foundation laid by Dr. B. R. Ambedkar, the father of the Indian Constitution and the reason marginalized communities in India have any legal ground to stand on at all. Every right cited in this report, every law invoked on behalf of sanitation workers traces back to his lifelong fight to build a legal framework that recognised their civil rights. His rallying call: Educate, Agitate, Organise is the logic behind this entire project.

This project began with a photograph. The work of photographer Palani Kumar, his unapologetic, deeply human documentation of the lives and deaths of manual scavengers in India, made this problem impossible to look away from. It is because of his photographs that this thesis exists. One of his photographs, which moved me deeply, is the image I chose for the cover of this report.

Thank you to Safai Karmachari Andolan (SKA) for their willingness to engage with this work. Their contribution has played a vital part in shaping what the project has become. I want to thank every participant who gave their time to be interviewed for this research. Their knowledge, experience, and honesty shaped this project in ways no academic source could have. I also want to acknowledge Divya Bharathi and her crew for the documentary 'Kakkoos'. The extraordinary effort that went into making the film brought me much closer to the reality of sanitation workers' lives.

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I would not have done this without all your love and support.

Executive summary

Manual scavenging, the manual removal of human excreta from sewers, septic tanks, and dry latrines, remains active in India despite prohibition under the 1993 Act and the MS Act 2013. The practice is not an oversight of the legal system; it is a product of it. The government maintains a zero-death record through semantic evasion, reclassifying sewer deaths as hazardous cleaning accidents, denying victims their legal identity and their families compensation. In 2025, the government reported 54 deaths while Safai Karmachari Andolan (SKA) documented 121; in the first 80 days of 2026, 41 workers had already died. Rooted in the caste system and forced upon Dalit communities as a hereditary occupation, the practice is sustained by generational poverty, institutional impunity, cultural indifference, and the deliberate absence of worker identity documentation. Without formal records, workers cannot be counted, compensated, or protected.

This thesis approaches manual scavenging as a wicked problem that cannot be resolved through isolated, single-domain interventions. Using systemic design, the research combines desk research, expert interviews with frontline activists and journalists, and documentary analysis, structured by the Rich Context Map and the Iceberg Model from the Systemic Design Toolkit.

The Causal Loop Analysis identifies five feedback loops sustaining the system, including the poverty trap, the impunity loop, and the data suppression loop, and five leverage points. The most critical is the absence of worker identity documentation, the single node enabling both data suppression and informal death settlements.

The proposed intervention is Saatchi (Tamil for witness or evidence), a digital platform prototype to be designed in partnership with SKA. It addresses all the leverage points through four features: a registration system generating a Saatchi ID for every worker with parallel e-Shram government enrollment; a physical kit containing safety gloves, an ID-stamped disposable camera, and rights and emergency information in the worker's native language; a legal aid section making entitlements and compensation rights legible and channelling cases into SKA's legal infrastructure before informal settlements can be forced; and a courses and sources section linking every claim to its primary source.

The prototype and report were validated with SKA's founder and National Convenor, who affirmed the concept; the Convenor immediately recognised semantic evasion as what SKA terms "deliberate denial." Two revisions emerged: because the MS Act prohibits employing manual scavengers, the ID must be reframed as a membership record of a collective; and the gloves risk presenting the work as carrying a benefit, encouraging entry into an occupation that should be eradicated rather than equipped. Both will be incorporated before any pilot.

The report concludes that the system is selectively functional: where visibility and pressure exist, the MS Act is invoked; where workers remain undocumented, the law lies dormant, confirming documentation as the decisive leverage point. Saatchi is presented as a conceptual proposal to SKA, to be piloted should they take it forward. The thesis closes with its founding position: the complete eradication of manual scavenging, with responsibility resting on a state that must recognise sanitation workers as civil employees with full protections, and on a public that must take ownership of the waste it produces.

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Glossary

1. **Aajeevika Bureau:** A non-governmental organisation based in Rajasthan, authorised by the state Labour Department in 2008 to issue identity cards to migrant and informal workers. Used in this thesis as the legal and institutional precedent for the Saatchi ID model.
2. **Article 21** of the Constitution of India guarantees every person the right to life and personal liberty, interpreted by the Supreme Court to include the right to live with dignity. Cited by SKA in its formal demands for state accountability in sewer deaths.
3. **Arunthathiyar / Paraiyar:** Sub-communities within the Dalit social group in Tamil Nadu, historically assigned hereditary sanitation and waste-related labour under the caste system. Referenced in this thesis in the context of rural pit-emptying practices documented in the Kakkoos film and expert interviews.
4. **Ayushman Bharat PM-JAY Pradhan Mantri Jan Arogya Yojana** is India's national public health insurance scheme providing hospital coverage to eligible families. Identified manual scavengers registered under the SRMS scheme receive five years of coverage.
5. **Bandicoot:** A sewer-cleaning robot developed by Genrobotics, a student startup from Kerala, representing the first commercially deployed mechanised alternative to manual sewer entry in India.
6. **Caste System:** A hereditary social hierarchy originating in South Asia in which communities are assigned fixed social roles, occupations, and degrees of ritual purity or impurity. The ideological foundation for the forced assignment of sanitation and waste-handling labour to Dalit communities.
7. **Causal Loop Diagram (CLD):** A visual systems thinking tool that maps relationships between variables in a system, showing how they reinforce or counterbalance one another over time. Used in Chapter 3 to identify self-reinforcing cycles sustaining the practice of manual scavenging.
8. **Community Attested:** The second verification tier in the Saatchi ID system, achieved when a colleague, family member, or SKA field worker independently confirms a worker's registration. Upgrades the ID from self-registered status and strengthens its legal credibility.
9. **Contractualisation:** The practice by which government bodies outsource sanitation work to private contractors and sub-contractors, creating layers of intermediaries that dilute employer liability, strip workers of formal employment status, and remove their access to the legal protections and benefits mandated by the MS Act 2013.
10. **Dalit Communities** occupy the lowest position in the Hindu caste hierarchy, historically classified as "untouchable" and assigned occupations involving contact with waste, death, and bodily matter. The term, meaning "oppressed" or "broken," was reclaimed as an identity term by the community itself.
11. **Design Thinking:** A human-centred, iterative problem-solving approach that emphasises empathy, experimentation, and collaboration with the people embedded within a problem. The complementary discipline to systems thinking within systemic design.
12. **Desludging:** The process of removing accumulated sludge from a septic tank or sewer. Mechanised desludging uses suction trucks and eliminates the need for human entry; manual desludging requires a worker to physically enter the tank or drain.
13. **Dry Latrine:** A toilet that does not use water to flush waste, instead depositing it directly into a pit or container that must be manually emptied. Prohibited under the PE Act 1993.
14. **Environmental Casteism:** A term from urban political ecology describing the structurally enforced condition in which Dalit communities are made to bear the ecological burden of a city's waste disposal, while being simultaneously denied the legal protections, wages, and dignity afforded to other workers.
15. **e-Shram:** A central government portal maintained by the Ministry of Labour and Employment that issues a 12-digit identification number to unorganised workers. Provides ₹2 lakh accident insurance and pension eligibility from age 60. Requires an Aadhaar-linked mobile number and bank account for registration.
16. **FIR (First Information Report):** A written complaint registered with the police that formally initiates a criminal investigation. In the context of sewer deaths, FIRs are routinely not filed because families accept informal financial settlements from contractors before a case can proceed.
17. **H_2S (Hydrogen Sulphide):** A colourless, highly toxic gas produced by the decomposition of organic matter in sewers and septic tanks. One of the primary causes of death in confined sewer entry, fatal at concentrations above 700 parts per million.
18. **Iceberg Model:** An analytical framework from the Systemic Design Toolkit that deconstructs a complex problem by moving from visible surface events down through underlying structures, worldviews, and deep cultural myths. Used in Chapter 2 to structure the expert interview questions and analyse findings.
19. **ILO (International Labour Organisation):** A United Nations agency that sets international labour standards. The ILO defines manual scavenging as the removal of human excreta from public streets and dry latrines, and the cleaning of septic tanks, sewers, and gutters.
20. **Kakkoos:** A 2017 Tamil-language documentary directed by Divya Bharathi, documenting the working and living conditions of sanitation workers and manual scavengers across Tamil Nadu through direct testimony from workers, families, and activists. The title means "toilet" in Tamil. Used as a source of secondary qualitative data in this thesis.

Glossary

21. **Leverage Point:** A place within a complex system where a small shift in one variable can produce significant and cascading change across multiple interconnected loops. Concept drawn from Donella Meadows' systems thinking framework. Used in Chapter 3 to identify priority targets for intervention.
22. **Manual Scavenging:** The manual removal of human excreta from dry latrines, open drains, railway tracks, septic tanks, and sewers. Prohibited under the MS Act 2013. The government has narrowed its definition to the handling of excreta from dry latrines only, classifying sewer and septic tank cleaning as "hazardous cleaning" – a distinction this thesis characterises as semantic evasion.
23. **Manusmriti:** An ancient Hindu legal text belonging to the post-Vedic Dharmaśāstra tradition, which codified notions of ritual purity and impurity and assigned "unclean" occupations to communities at the base of the caste hierarchy. Cited in this thesis as part of the scriptural basis for caste-based occupational bondage.
24. **MS Act 2013 The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013:** Indian legislation that prohibits the employment of manual scavengers, mandates the provision of 44 items of protective equipment to any worker deployed near sewers or septic tanks, and establishes rehabilitation entitlements. Penalties include up to five years imprisonment where a worker dies due to employer non-compliance.
25. **NAMASTE (National Action for Mechanised Sanitation Ecosystem):** A joint scheme by the Ministry of Social Justice and Empowerment and the Ministry of Housing and Urban Affairs aimed at eliminating human entry into sewers and septic tanks by transitioning to mechanised cleaning, and providing sanitation workers with occupational safety training and social security benefits.
26. **Narada Samhita:** An ancient Indian text also belonging to the Dharmaśāstra tradition, cited alongside the Manusmriti as a scriptural source for the hereditary assignment of sanitation labour in pre-modern Hindu society.
27. **NCSK (National Commission for Safai Karmacharis):** A statutory body under the Ministry of Social Justice and Empowerment, responsible for advising the government on the welfare of sanitation workers and monitoring the implementation of the MS Act 2013. The primary official source for data on sewer and septic tank deaths in India.
28. **PE Act 1993 The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993:** The predecessor to the MS Act 2013, which first made the construction of dry latrines and the employment of manual scavengers a criminal offence in India.

29. **PIL (Public Interest Litigation):** A legal mechanism in Indian law that allows any citizen to petition the Supreme Court or High Courts on behalf of the public interest, without needing to be a directly affected party. Used extensively by SKA to bring manual scavenging deaths before the courts.
30. **PPE (Personal Protective Equipment):** Protective gear mandated by the MS Act 2013 for any worker deployed near sewers or septic tanks, comprising 44 specified items including gloves, masks, helmets, and full-body protective clothing. In practice, rarely provided by employers or contractors.
31. **Reinforcing Loop:** A feedback loop in which a change in one variable amplifies further change in the same direction, compounding the effect over time. This thesis identifies multiple reinforcing loops that together form a closed system sustaining manual scavenging.
32. **Rich Context Map:** A systems thinking tool from the Systemic Design Toolkit used to map the long-term trends, economic conditions, institutional structures, cultural norms, practices, and emerging initiatives that shape a system. Used in Chapter 1 to frame the sanitation labour system in India.
33. **Routine Activity Theory:** A criminological framework proposed by Cohen and Felson (1979) stating that a crime occurs when a motivated offender, a suitable target, and the absence of a capable guardian converge simultaneously. Applied in this thesis to explain how the subcontracting system positions both the state and private contractors at sufficient legal remove from sewer deaths to evade accountability.
34. **Safai Karmachari:** Hindi term meaning "cleanliness worker." Used to refer broadly to sanitation workers in India, encompassing sweepers, drain cleaners, sewer workers, waste pickers, and septic tank cleaners. Workers classified under this term are among those most systematically denied formal employment status and legal protection.
35. **Safai Karmachari Andolan (SKA):** A national civil society movement working across 25 states for the eradication of manual scavenging and the rehabilitation of affected workers. Founded in 1994, SKA maintains its own parallel death count, legal aid infrastructure, and parliamentary advocacy network. The primary stakeholder partner for the Saatchi prototype.
36. **Semantic Evasion:** The deliberate use of language to reclassify an act or event in a way that removes its legal or moral weight. In this thesis: the government's reclassification of sewer deaths as "hazardous cleaning accidents" rather than manual scavenging fatalities, which prevents the MS Act 2013 from being invoked and allows the state to maintain a zero-death record for manual scavenging.

Glossary

37. **SRMS (Self Employment Scheme for Rehabilitation of Manual Scavengers):** A government scheme providing identified manual scavengers with a one-time cash payment of ₹40,000, free skill training with a ₹3,000/month stipend, a business loan of up to ₹15 lakhs with a 50% subsidy, five years of Ayushman Bharat health coverage, and education loans for children up to ₹10 lakhs
38. **Swachh Bharat Mission:** A flagship government sanitation scheme launched in 2014 aimed at eliminating open defecation by constructing household toilets across India. Critiqued in this thesis for increasing the volume of septic waste in rural areas without corresponding sewage infrastructure, deepening reliance on manual desludging.
39. **Systemic Design:** A methodology that integrates systems thinking and design thinking to address complex, multi-stakeholder problems. Systems thinking provides the analytical lens to understand how a system operates; design thinking provides the creative and participatory tools to intervene within it. The primary methodological framework of this thesis.
40. **Systemic Design Toolkit:** A library of 30+ tools developed by Peter Jones and Kristel van Ael, combining academic systems research and human-centred design practice, documented in Design Journeys Through Complex Systems (2022). This thesis uses two tools from the toolkit: the Rich Context Map and the Iceberg Model.
41. **Systems Thinking:** An analytical approach that focuses on how the components of a system interact and influence one another over time, rather than examining each component in isolation. One of the two disciplines integrated within systemic design.
42. **VISVAS:** A scheme under the NAMASTE programme providing social security support including insurance and pension to sanitation workers transitioning away from hazardous manual work.
43. **Wicked Problem:** A class of complex challenges, defined by Rittel and Webber (1973), that resist straightforward or definitive solutions. Characterised by multiple conflicting stakeholder interests, non-linear causality, and systemic interconnectedness across social, political, economic, and cultural domains. Applied in this thesis to manual scavenging.

1 Introduction

Manual scavenging is one of the modern practices of the caste system in India. The International Labour Organisation defines manual scavenging as the removal of human excreta from public streets and dry latrines, and cleaning septic tanks, sewers, and gutters. The Indian law prohibits the construction of dry latrines (Prohibition Act of 1993) and the employment as manual scavengers (MS Act 2013) and provides rehabilitation to the victims and their families (MS Act 2013). Although strictly prohibited by both International and Indian law, the practice stubbornly persists. This practice has historically been forced upon Dalit communities (the lowest community in the caste hierarchy), reinforcing a structure of hereditary occupation, stigma, and social exclusion. To understand the history of caste in India, it is crucial to recognize that its ideological basis lies in post-vedic hindu scriptures, such as the ‘Manusmriti’ and the ‘Narada samhita’, which codified notions of ritual purity and assigned "unclean" tasks like waste disposal to the marginalized communities: the Dalits (Raj & Tiwari, 2025).

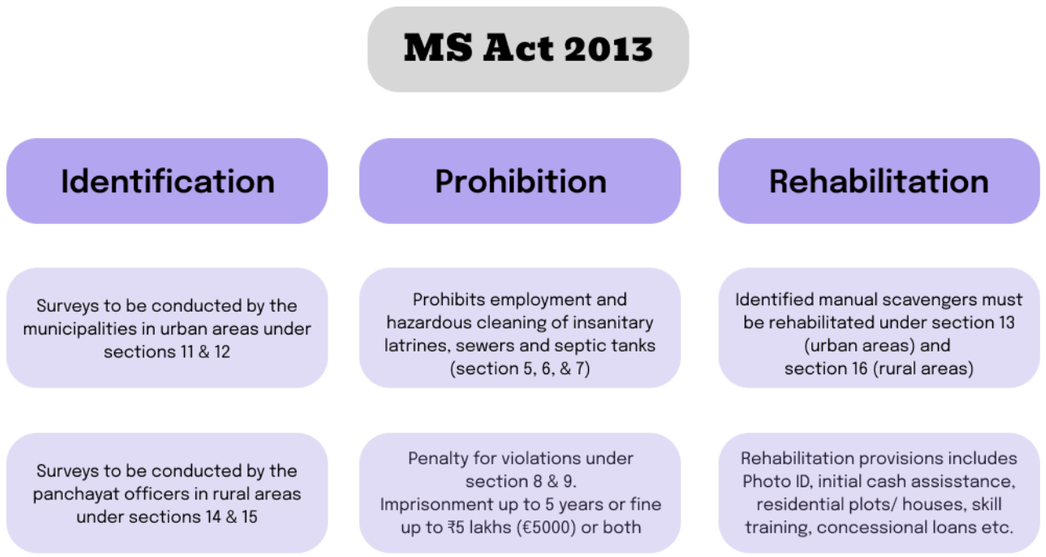


Figure 1: Key objectives of the MS Act, 2013 (Raj and Tiwari, 2025)

Even though many technological and policy-based solutions have been proposed and attempted, they have not resulted in sustainable eradication due to isolated and non-complementary solutions. For instance, government rehabilitation programs have proven largely inadequate: only 38.4% (22,294 individuals) of identified manual scavengers received skill training, and a mere 3.98% (2,313 individuals) received subsidized loans for alternative self-employment (Raj & Tiwari, 2025).

In an ideal sanitation system, there is no human interaction with human waste once the waste is flushed down the toilet. This ideal state can be achieved by combining technological, political, and administrative perspectives under one umbrella to propose design interventions from different directions of the system. The thesis will focus on understanding the existing systemic failures, identifying potential leverage points, and introducing design interventions to shift the system towards an ideal condition where manual scavenging is sustainably eradicated.

1.1 Problem brief

According to the Manual Scavenging Act of 2013, hazardous cleaning of sewers and septic tanks is strictly prohibited. Construction of unsanitary dry latrines or employing manual scavengers to clean unsanitary latrines, open drains, septic tanks and sewer lines is prohibited and criminalized. Repeated offenders can get up to 5 years of imprisonment (Singh, 2020). However, the official state responses expose a stark contradiction between policy and reality. In 2025, the Ministry of Social Justice and Empowerment, while addressing a parliamentary inquiry regarding the safety and fatalities of sanitation workers, stated the following: “No death has been reported due to manual scavenging... Deaths have occurred... due to hazardous cleaning of sewers and septic tanks” (Ministry of Social Justice and Empowerment, 2025). This response, delivered by the Minister of State, Shri Ramdas Athawale, relied on data from the National Commission for Safai Karmacharis (NCSK) revealing that 113 persons lost their lives in just the previous two years (63 in 2023, and 50 in 2024) due to this "hazardous cleaning". States like Rajasthan recorded 17 deaths, Maharashtra 19, and Gujarat 10 in this brief period (Ministry of Social Justice and Empowerment, 2025).

The government maintains a "zero-death" record for manual scavenging by exploiting an outdated legal definition that limits the practice to the manual handling of excreta from dry latrines. The government categorizes the cleaning of sewers and septic tanks as "hazardous cleaning," this is a form of semantic evasion of manual scavenging functioning under a different name. By grouping manual scavengers under the broad umbrella of general sanitation workers who typically collect trash or clean public toilets. The state ensures that the specialized rehabilitation benefits and legal protections promised specifically to manual scavengers, under the MS Act 2013, no longer apply to them. Unlike many social crimes, the State simultaneously acts as the perpetrator and the prosecutor. This phenomena is explained by the Routine Activity Theory: for a crime to be committed, there has to be a motivated offender, suitable target and an absent guardian all together at the same time (Cohen and Felson, 1979).

In the case of manual scavenging, manual scavengers are employed by sub-contractors of the contractors, who are hired/ leased by the government ((Raj & Tiwari, 2025). Contractors frequently exploit a loophole in Section 2(g)(b) of the MS Act 2013 that conditionally permits manual cleaning if "protective gear" is provided, routinely hiring vulnerable informal labor without providing any actual safety equipment to minimize costs. So the government indirectly becomes the enabler of the very crime that it has banned. This is the root cause of the problem.

Manual scavenging, as the evidence above demonstrates, is not a simple or bounded problem. It is what scholars of design and policy refer to as a wicked problem: a class of challenges that resist straightforward, definitive solutions. Wicked problems are characterised by multiple, often conflicting stakeholder interests; unclear cause-and-effect relationships where causes and effects are deeply entangled and non-linear, often rippling across social, environmental, economic, and political systems simultaneously (Curatella, 2020). Like poverty, climate change, and large-scale migration, manual scavenging cannot be resolved through isolated, single-domain interventions. The persistence of the practice despite decades of legislation, rehabilitation schemes, and technological proposals is itself evidence of this: each intervention has addressed one fragment of the system while leaving the structural conditions that sustain the practice largely intact.

1.2 Design objective

Given the wicked nature of the problem and its entangled social, legal, economic, and infrastructural dimensions, the project adopts systemic design as its core methodology, an approach built specifically to address the kind of multi-stakeholder complexity that manual scavenging presents. The design objectives are broken down into the following directions:

Research phase:

1. Conduct systemic research on the sanitation infrastructure and stakeholder system in India to devise a system/stakeholder map
2. Identify the leverage points to shift the system towards a desirable future, using the system/stakeholder map and causal loop diagram

Design phase:

3. Explore the intervention directions and develop the interventions into a prototype
4. Obtain feedback on the prototype from the primary stakeholder (Safai Karmachari Andolan)

1.3 Methodology

To address a wicked problem, the methodology must be equipped to operate at the level of the system itself, not merely its symptoms. This project adopts systemic design as its primary methodological framework. Systemic design is an integration of systems thinking and design thinking where systems thinking provides the analytical lens to understand complexity of the problem and design thinking provides the creative and participatory tools to act within that complexity. In simple words, systemic design means zooming out to comprehend how the parts of a system influence one another, and then zooming back in to collaboratively design solutions with the stakeholders who are embedded within that system.

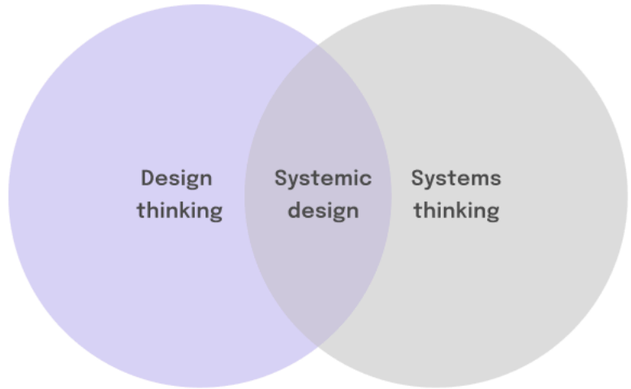


Figure 2: Systemic Design Toolkit by Kristel van Ael of Namahn (Curatella, 2020)

Traditional design approaches largely decompose a complex problem into smaller, more manageable parts and address each component separately. This approach is effective for well-defined, bounded problems but it can generate unintended consequences when applied to complex, multi-stakeholder challenges. Solving one part of the system in isolation may simply shift the problem elsewhere, or inadvertently create new ones. Systemic design, by contrast, resists this fragmentation. It insists on maintaining a view of the whole system while designing interventions, accounting for the relationships and dynamics that a component-by-component approach would overlook (Curatella, 2020). For manual scavenging, this holistic approach is not merely preferable, it is necessary. The problem persists precisely because prior interventions have been reductionist: rehabilitation schemes without capital support, legislation without enforcement mechanisms, technological alternatives without social or cultural integration.

We start by defining what the system is, its boundaries, and how to shift it from its current state A to desireable future state B. This system-shifting design is based on identifying leverage points present within a complex system where a small shift in one thing can produce significant changes in everything (Bijl-Brouwer, 2023). By identifying these leverage points, we can move towards the targeted design interventions, by altering the underlying systemic patterns rather than applying short-term band-aid fixes (van Arkel & Tromp, 2024). In the book ‘Design journeys through complex systems’ Peter Jones and Kristel van Ael talk about dealing with complex systems through a systemic design methodology called the ‘Systemic design toolkit’. This toolkit is a library of 30+ tools designed based on academic research and human-centre design expertise.

Out of the many tools across the seven phases of the Systemic Design Toolkit, this project will employ two tools for it’s research phase:

1. Framing the system using 'Rich Context' mapping (Systems Thinking)
2. Listening to the system using 'Iceberg Model' research questions (Design Thinking)

The findings of the research phase will be synthesised into a system map, and will be used to identify the leverage points within the system where a targeted intervention is most likely to produce a meaningful change. From these leverage points, the characteristics and qualities for an effective intervention emerge from the system itself. After these qualities are developed into tangible, testable interventions, the final stage of the process is to test the prototype and iteratively refine it in collaboration with the primary stakeholder, Safai Karmachari Andolan. The conclusions drawn from this process will reflect the effectiveness of the prototype and the capacity of systemic design as a methodology to address wicked problems of this nature. The working boards behind each stage of the analysis, including explored directions that were later set aside, are documented in Appendix A.

2 Framing the current system

Framing is essential to subjectively define the system's boundaries determining what is included and excluded from the research scope (Jones & Van Ael, 2022). For this thesis, framing helps construct a holistic panorama of the socio-technical system of sanitation labor in India. Based on the research data obtained so far, the system is deconstructed into macro-level drivers and micro-level realities to understand the underlying forces causing a cycle of exploitation.

Research indicates an intimate connection between infrastructure and law; when physical sanitation infrastructure (like sewage systems) is inadequate, marginalized people become the infrastructure (Gupta, 2024). The state achieves a facade of cleanliness by utilizing Dalit bodies to maintain the urban metabolism of waste (Karamchedu, 2025). While a shift toward mechanized desludging (using suction trucks) is occurring, severe occupational hazards persist. Often, the inappropriate design of septic tanks, lack of vent pipes, and disposal of solid objects require workers to manually break seals or enter tanks. Workers face extreme risks, including inhalation of fatal hydrogen sulphide (H_2S) gas, direct contact with sludge leading to skin infections, and severe physical injuries. Legally mandated Personal Protective Equipment (PPE) is rarely used because it is often poorly designed for Indian conditions, hinders mobility in heavy lifting, and lacks proper maintenance (Gautam et al., 2021).

A major structural barrier is the rapid contractualization of sanitation work. Municipal corporations and large entities like the Indian Railways frequently outsource sewer maintenance to private contractors to cut costs (Karamchedu, 2025). This drives down wages, strips workers of benefits like healthcare and pensions, and most importantly, absolves the government of direct legal liability when workers die inside sewers (Gupta, 2024 & Karamchedu, 2025). Public litigations by Dalit NGOs are highly constrained by a hostile socio-political opportunity structure. Deeper dive into grassroots advocacy reveals that Dalit activists face severe casteist backlash, irritation, and verbal abuse from government officials when requesting data or demanding the enforcement of the MS Act 2013. Dalit NGOs have consistently prioritised direct engagement with administrative bodies over litigation, approaching government officials first to push for policy change and turning to the courts only when institutional channels prove unresponsive. This heavily weighed against the risk of further victimizing the affected workers (Kahle & Kumbhare, 2023).

Finally, despite stringent legislative prohibitions, state-sponsored rehabilitation schemes have largely failed to break the chains of discrimination. Very few identified manual scavengers successfully receive the promised capital subsidies, one-time cash assistance, or skill development training required to transition into alternative livelihoods (Shalini et al., 2025). Without a reliable, nationwide enumeration of scavengers and robust enforcement of social security programs, the community remains economically trapped in caste-based occupational bondage (Singh et al., 2020).

System & stakeholders 2.1

The rich context template is used to help divide the system into long-term, economic, cultural, institutional and practical trends, and emerging niches. By filling out this template, we can visualize the different factors contributing to the existing system.

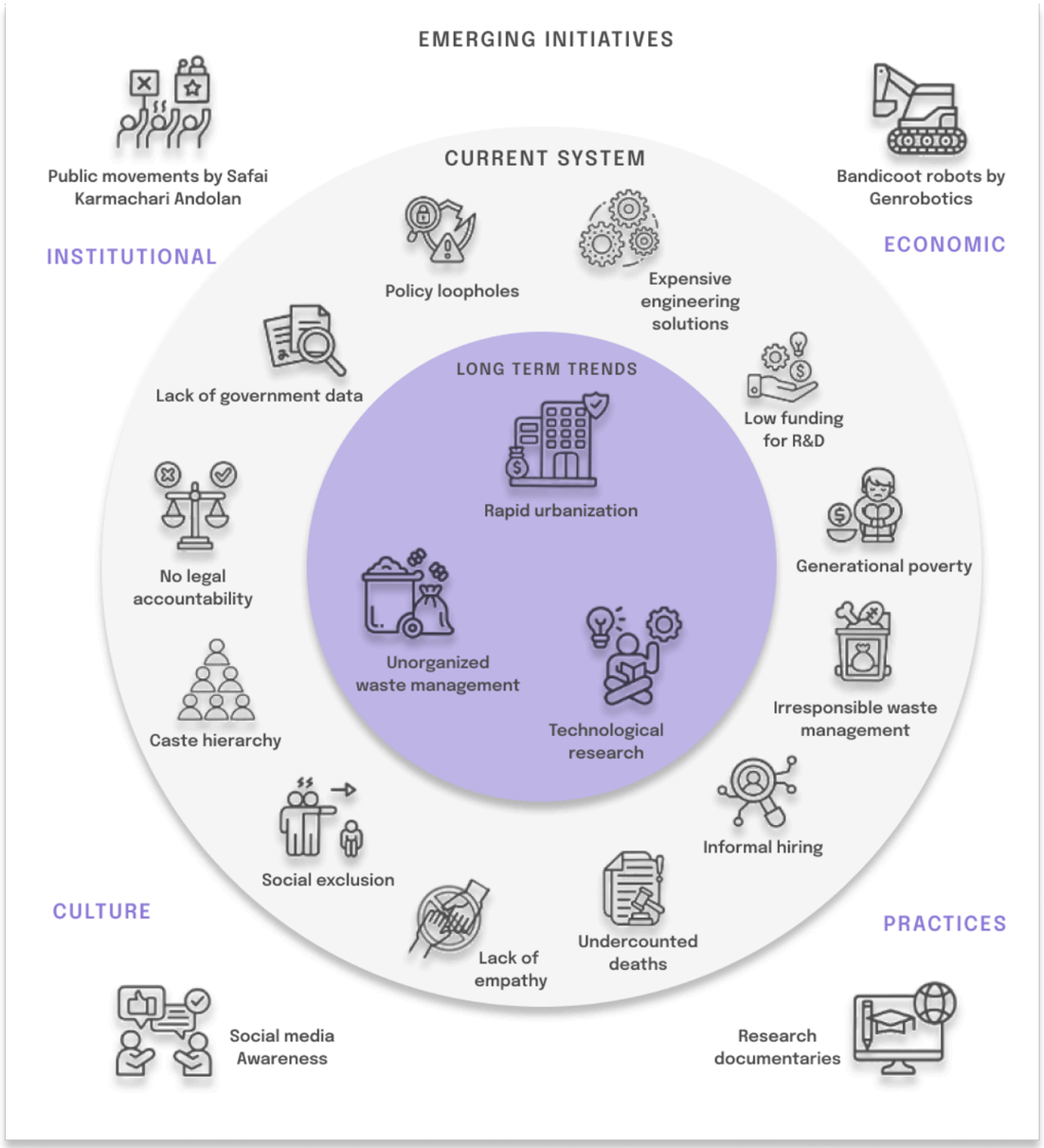


Figure 3: Rich Context Map

Long-term trends

As cities densify, human settlements expand faster than sewage networks increasing dependence on manual intervention in aging and overloaded systems. The critical limitation of urbanization is unevenness, the positive trends are concentrated in urban centres, while rural regions- where dry latrines and open defecation still exist and enforcement is weakest- remain largely untouched by both technological investment and cultural reform. A just transition requires that mechanisation and awareness reach these regions simultaneously, rather than leaving rural communities behind as cities modernise.

Economics

The economic logic sustaining manual scavenging is built on the intersection of generational poverty and the deliberate suppression of alternatives. Dalit communities, historically excluded from land ownership, formal employment, and capital accumulation, inherit both the occupation and its stigma across generations, making exit structurally difficult even when legally permitted. Without capital or sustained support, economic necessity overrides legal prohibition. Simultaneously, low funding for sanitation research and the high cost of mechanised alternatives such as the Bandicoot sewer-cleaning robot by Genrobotics, which costs approximately ₹15,00,000 (~€15,000) per unit make human labour the default economic choice for contractors and municipalities operating under tight budgets. The system thus sustains itself economically: poverty traps workers in the occupation, while underinvestment in technology removes the pressure to replace them.

Institutional

The institutional framework governing manual scavenging is characterised by deliberate legal ambiguity, selective data production, and structural evasion of accountability. When deaths are miscategorised, victims cannot be identified, compensation cannot be claimed, and rehabilitation cannot happen. Informal and contractual hiring compounds this by employing workers through layers of sub-contractors, as explained by the Routine Activity Theory (Cohen and Felson, 1979), both state and private actors distance themselves from the offence to escape liability, while the workers themselves remain without the employment records needed to access the protections the law nominally guarantees them.

Cultural

The cultural foundation of this system rests on three forces, caste hierarchy, social exclusion, and lack of empathy. Caste hierarchy normalises the assignment of “unclean" labour to Dalit communities, embedding the assumption that waste handling is a hereditary obligation rather than an occupation deserving rights or dignity. Sanitation workers are simultaneously indispensable to urban life and invisible within it, their suffering treated as structurally irrelevant. At the broadest level, this manifests as a systemic lack of empathy: households, restaurants, hospitals, and businesses with no waste separation and no consideration for the workers who handle it by hand.

Practices

Informal hiring of workers without contracts, identity records, or legal protections is standard practice, deliberately structured to keep sanitation workers outside the reach of the MS Act 2013. Lacking formal employment status, workers are routinely denied safety gear, and when deaths occur in sewers and septic tanks, these are recorded as accidents rather than occupational fatalities. The result is a systematic undercounting of deaths, enabled by the same semantic evasion discussed in the institutional analysis. Compounding the physical danger is irresponsible waste management by the public: improperly disposed wet wipes, sanitary products, and solid waste routinely block drainage systems, which increases the frequency of manual interventions and the risk of fatal exposure to toxic gases. Taken together, these practices form a self-reinforcing loop in which cultural indifference makes exploitation possible, while normalised exploitation makes the culture itself harder to challenge.

Emerging initiatives

Despite the systemic rigidities documented across all layers of this map, two significant interventions are beginning to challenge the status quo: one technological, one civic. Genrobotics' Bandicoot, developed by a student startup, represents the first serious engineering intervention in mechanised sewer cleaning in India. While its cost remains a barrier to widespread adoption, its significance lies less in its current scale and more in its philosophical departure from the existing model. Genrobotics operates on an explicitly human-assistive design principle: the belief that hazardous environments should be the domain of machines, not humans. With technology designed to empower the worker rather than erase them from the system, especially in a sector where human expendability has been institutionally normalised, this represents a foundational shift in how the problem is framed at the engineering level. The challenge ahead is bringing the cost of such solutions within the reach of municipal budgets, particularly in smaller cities and rural regions.

On the civic front, NGOs like Safai Karmachari Andolan and other independent activists continue to be the most sustained and forceful challengers to the system. In March 2026, SKA organised the ‘Stop Killing Us’ movement at Jantar Mantar, New Delhi, drawing workers and bereaved families from ten states to demand an end to sewer deaths, data transparency, and a national apology from the Prime Minister (Valmiki, 2026). The protest exposed a major data discrepancy: while the government reported 46 deaths in 2025, SKA documented 121, with 116 SKA-recorded deaths against the government's 55 in 2024 (Valmiki, 2026). In the first 80 days of 2026 alone, 41 workers had already died. SKA's formal demands like accurate death counts presented to Parliament, a time-bound national action plan, guaranteed right to live with dignity under Article 21, and accountability for senior government officials represent not merely protest, but a comprehensive institutional reform agenda built on over four decades of frontline documentation.

2.2 Recognizing all sanitation workers

While the initial research focus centred on manual scavengers entering sewers and septic tanks, where the most visible and fatal incidents occur, the research was broadened by a 2017 Tamil-language documentary, Kakkoos (meaning "toilet" in Tamil), directed by Divya Bharathi. The film offers a ground-level account of the everyday reality of other sanitation workers including manual scavengers across Tamil Nadu, documenting their living conditions, recruitment practices, occupational hazards, and the near-total absence of legal protection, through direct testimony from workers, families, and activists. Its graphic and unmediated portrayal of conditions that policy documents routinely obscure makes it a significant source of secondary qualitative data for this research. A member of the film's crew was subsequently interviewed as part of the primary research phase, bringing first-hand knowledge of the documentary's field findings into direct dialogue with the broader interview analysis.

Sanitation workers who sweep cities and villages, clean railway tracks and public toilets, and collect household garbage are also in routine, direct contact with human waste. Women, who constitute approximately 90% of the broader scavenging workforce, bear an additional and distinct burden: the repeated carrying of extremely heavy loads of garbage causes severe reproductive health consequences, including uterine dislocation, while routine physical and sexual abuse by supervisors constitutes a parallel but largely undocumented form of occupational violence. Yet, they are systematically denied even the most basic safety provisions: no masks, no gloves, no protective clothing. The MS Act 2013 mandates 44 specific safety tools for any worker deployed near sewers or septic tanks, yet in practice workers receive none of them, making every deployment a criminal breach of the law by default. Beyond physical danger, they are severely underpaid and frequently not paid on time, often being forced to purchase their own cleaning equipment, such as brooms, out of pocket, driving them deeper into financial precarity. Informal workers are paid as little as ₹ 150-210 (~€2) per day and are systematically denied attendance registers and official identity cards, ensuring that if a worker is electrocuted or dies in a sewer, the municipality can legally deny they were ever employed. (Kakkoos documentary, 2017).

Most critically, this wider pool of informal, exploited sanitation workers is treated by the state and private contractors as the primary reserve of "suitable candidates" to be pushed into sewers and septic tanks when the need arises.

The Kakkoos documentary exposes an alleged recruitment method followed by the Chennai Metro Water Board whereby youth are made to strip, drink alcohol, and compete by measuring who can hold their breath the longest while suspended on a rope inside a sewage ditch; the one who endures the longest is hired. The pipeline into the most dangerous work begins here. For this reason, any intervention aimed at eradicating sewer deaths must begin by recognising all sanitation workers as manual scavengers, not just those inside the manholes, as part of the same system of exploitation.

Listening to the system

3

The second stage of the research moves beyond desk research to gather qualitative, experiential knowledge directly from stakeholders embedded within the system. Where as first stage mapped the visible structure of the problem, this stage listens for what data and policy documents cannot capture: the lived logic of the system as experienced by those fighting it from within. The interview process was guided by the Iceberg Model, an analytical framework from the Systemic Design Toolkit that deconstructs complex systems by moving from visible surface events down to their hidden root causes (Appendix B). The questions were deliberately structured across four levels of the Iceberg Model:

The Litany: Surface-level events, reported deaths, official statistics, and visible daily realities

Structures and Systems: Underlying social, economic, technological, and legal frameworks, including contractualization, policy loopholes, and technological gaps

Worldviews and Values: The caste paradigms, societal norms, and collective apathy that legitimise structural failures

Deep Myths: The unconscious beliefs and historical narratives that anchor the entire system in place

3.1 Expert insights

Interviewees were identified through their published works, documented activism, and field research associated with manual scavenging, and were approached directly based on the depth and relevance of their engagement with the issue.

Prior to being approached, Human Resource Ethics Committee (HREC) approval was obtained covering the interview format, the risks involved in participation, data storage procedures, anonymisation practices, and transcription processes (Appendix C). These details were also outlined in the consent form provided to each participant and were explained to all interviewees before the start of every interview (Appendix D). All interviews were conducted online, lasting between 45 and 90 minutes, in both English and Tamil depending on the interviewee's preference. Interviews conducted in Tamil were translated into English prior to transcription, with care taken to preserve the original meaning and register each response. Interviews were conducted with three frontline experts, each bringing a distinct but complementary form of knowledge built over decades of direct engagement with the issue:

1. Muthuvel (name changed): A documentary photographer with nine years of field experience, who has documented between 60 and 70 manual scavenging deaths and works closely with the families of victims
2. Nithya (name changed): A senior journalist and activist with 25 years of experience in Tamil print and television media, specialising in caste violence and the marginalisation of sanitation workers
3. Safai Karmachari Andolan representative: A senior human rights activist from SKA, a national movement that has spent over 40 years fighting for the eradication of manual scavenging and the full rehabilitation of affected workers

The Litany (events and trends)

Sewer and septic tank deaths reported as accidents: The most visible surface event is the recurring death of sanitation workers inside manholes and septic tanks, reported not as murders or crimes, but as unfortunate mishaps. Mainstream media consistently frames these deaths using euphemistic language: septic tanks become "water tanks," and workers are said to have "slipped and fallen." This framing removes the criminal dimension entirely, rendering each death a one-time tragedy rather than a pattern of structural violence. As Muthuvel, who has documented over 60 such deaths, observed:

> *"Death keeps happening inside these manholes and septic tanks daily. This has become a daily routine. To nobody, this is a big issue; it's just headline news. 'Oh, they are dying, why work there?' and they just move on." - Muthuvel*

Nithya confirmed that this was not always a conscious editorial choice but a long-standing cultural default:

> *"The mainstream media did not report properly on this for a long time; it was only around 2015 that they started reporting them as manual scavenging deaths. Before that, they were just considered “accidents.” - Nithya*

Data manipulation and semantic evasion: Behind the media framing, lies a deliberate institutional strategy. The government does not claim zero deaths. It claims there is no manual scavenging, a definitional sleight of hand that erases the legal category under which deaths would trigger accountability. The SKA Representative made the discrepancy explicit:

> *"They are not saying zero, they are saying 'there is no manual scavenging.' According to our data, from January to December 2025, there were 121 documented deaths. The government stated in parliament that only 54 deaths happened last year. If 121 died and you only count 54, it means 67 people's lives are not even being counted." - SKA Representative*

Structures & Systems (underlying causes)

Structural violence via informal hiring and contractualization: The most consequential structural mechanism is the layered subcontracting system that insulates the state from legal responsibility. The SKA Representative articulated the core contradiction clearly:

> *"The principal employer is the government. Sanitation, water supply, and health are the primary responsibilities of the government. Giving the work to a contractor does not mean the government can wash its hands of protecting lives. Because these workers are from vulnerable communities and lower castes, the government tries to escape responsibility." - SKA Representative*

Impunity through forced compensation: When deaths do occur, the formal legal process is systematically bypassed through an informal compensation arrangement that prevents any prosecution from proceeding:

> *"The police and the state avoid paying directly. Instead, they force the contractor who illegally hired the worker to pay 10 lakhs to the victim's family to withdraw the case. No FIRs are filed, no charge sheets are made, and no one goes to jail. Since not a single person has been convicted under this law in independent India, the cycle simply continues." - Nithya*

Technological theatre without R&D: The appearance of technological progress masks an almost complete absence of serious investment. Nithya described one particularly revealing incident:

> *"Whenever funds are allocated, the IITs or institutions create fraudulent or impractical machines just to utilize the budget. They once built a massive, elephant-sized machine, heavily promoted it in the media, but it was completely impractical and ended up being used by a worker to dry clothes outside his house." - Nithya*

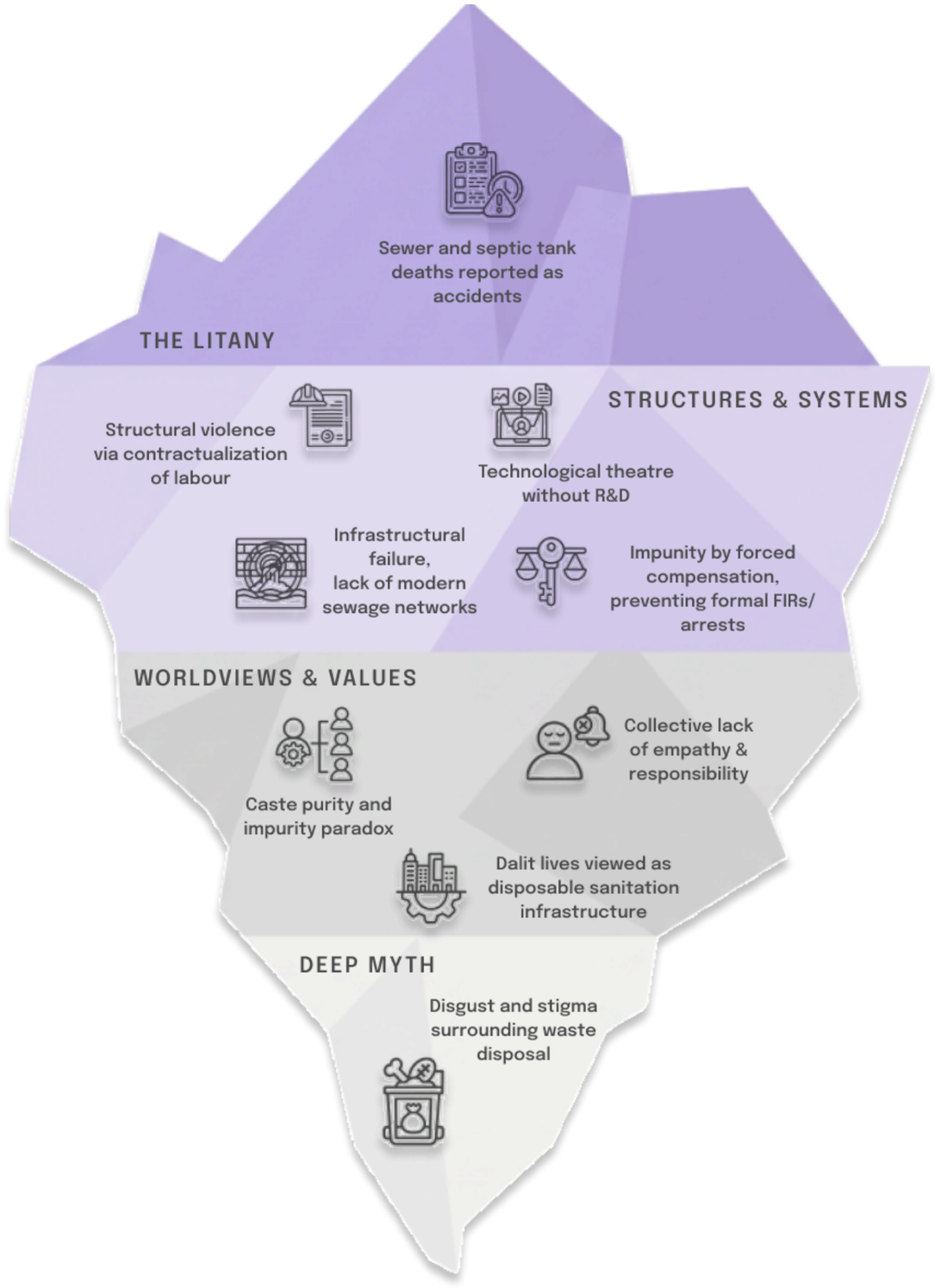


Figure 4: Iceberg model

Infrastructural failure: The Swachh Bharat Mission, widely celebrated as a sanitation achievement, in practice deepened the crisis:

"Swachh Bharat actually increased the burden on manual scavengers. In villages, the government built millions of toilets consisting of just two pits, with no proper sewage lines or drainage networks. When these pits fill up, they call the lowest castes: the Arunthathiyars or Paraiyars and force them to clean the human waste manually." - Nithya

Worldviews & Values (paradigms)

Caste purity and impurity paradox: The deepest operational belief sustaining the system is that certain bodies are made for contact with waste. Nithya identified this not as ignorance but as active preference by dominant castes:

"If sanitation were truly modernized and mechanized into a lucrative business, it would become inclusive, and people from all castes would enter the profession just like how the salon business broke the caste monopoly of barbers. But the dominant castes do not want this; they want to keep manual scavenging as a hereditary, caste-based occupation." - Nithya

Collective lack of empathy and responsibility: The deaths occur not in remote locations but at the heart of modern civic life which makes the indifference all the more disturbing.

"These deaths happen everywhere in High Courts, giant malls with modern equipment, Anna University, and hotels yet no one questions how a human being can be sent into a tank filled with toxic chemical gases, germs, and months-old human waste." - Nithya

Dalit lives viewed as disposable sanitation infrastructure: Muthuvel, who has witnessed this dehumanisation up close across decades of documentation, described its most open expression:

"No matter how many people die, they still deeply want to use people and they use them. There is a situation where they don't even see them as humans. They are not humans; they are just there to do the work." - Muthuvel

Deep Myth (metaphors)

Disgust and stigma surrounding waste disposal: The deepest layer of the system is not a political ideology or a policy failure it is an embodied, culturally transmitted disgust toward waste, and the stigma that attaches itself permanently to those who handle it. Indian society, Nithya observed, has built its civic culture around the complete outsourcing of waste-related responsibility:

"Indians don't take responsibility, they don't clean their toilets, they don't take their trash, because cheap labour is easily available. The mindset is: 'I will produce waste, someone else will clean it.' Even highly educated people do this." - Nithya

This disgust is not merely passive; it produces active social invisibility. As Muthuvel documented across years of field work, sanitation workers and their families live physically isolated on the outskirts of villages, in huts without facilities, without proper graveyards, on roads too narrow to carry a coffin:

"Society keeps them hidden. Mostly, where they live is a big question mark. If a death happens, only then does society realize where they live and what kind of houses they are in." - Muthuvel

The stigma of waste extends beyond occupation into every dimension of life so thoroughly that even moments of public recognition are revealed as performative rather than genuine. During COVID-19, sanitation workers were garlanded, their feet washed, their work celebrated. Yet as Muthuvel pointedly noted:

"Only during COVID times will they call them frontline workers, put garlands for them, and wash their feet. But when they protest for their work, for their salary, not a single person will stand with them. By making it holy, will his life become holy?" - Muthuvel

This is the deep myth in its most precise form: that the disgust surrounding waste is natural and inevitable, that someone must bear it, and that those who do are defined by it. It is this unconscious belief that allows a society to celebrate sanitation workers in a pandemic and ignore their deaths in a manhole. Until the stigma of waste is decoupled from the dignity of the people who manage it through education, cultural reform, and the redesign of sanitation as a shared civic responsibility, no legal or technological intervention will reach the root of the system.

Mapping the system 4

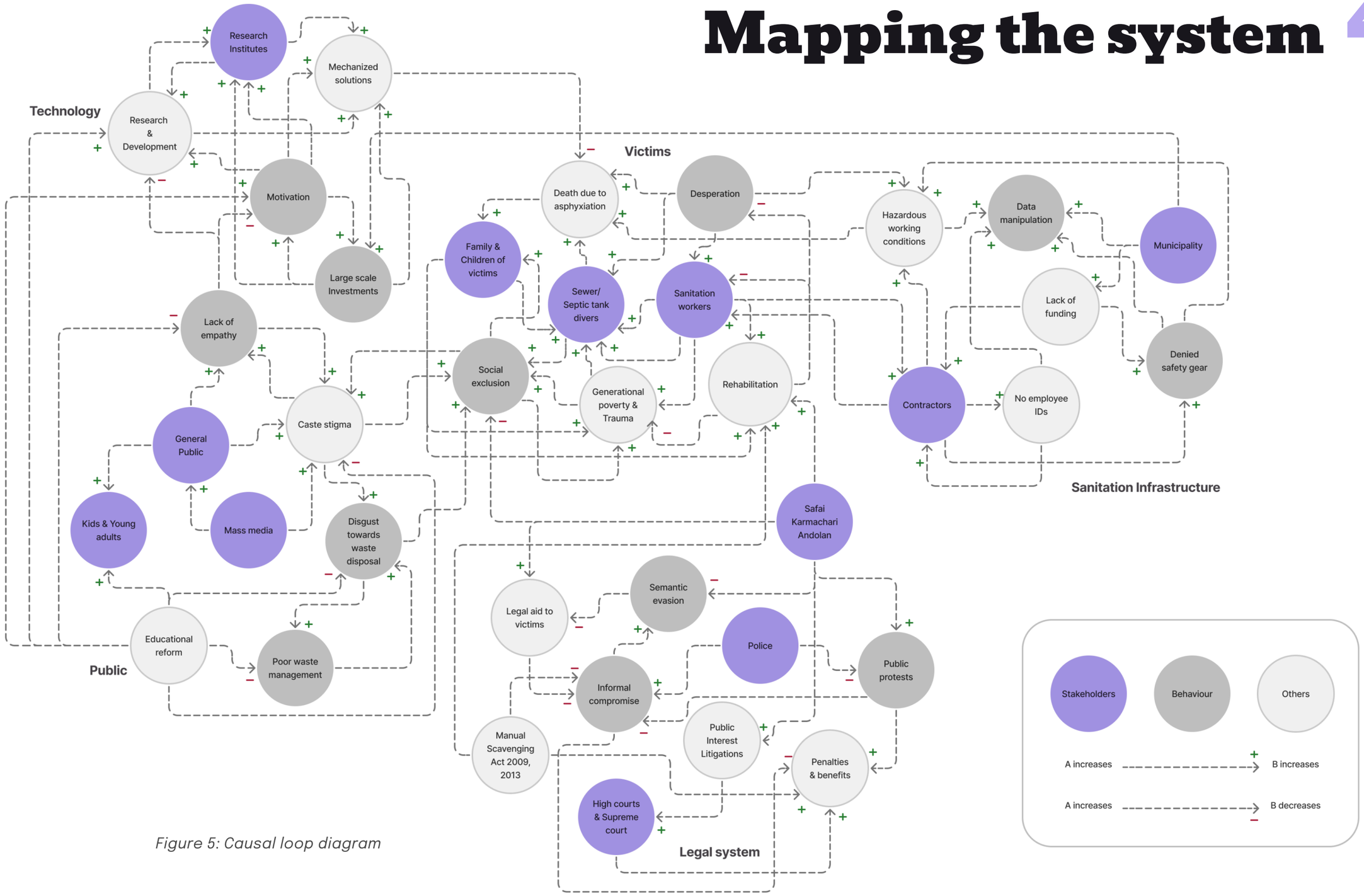


Figure 5: Causal loop diagram

The research phase which includes desk research, expert interviews, and documentary analysis, reveals that manual scavenging is not sustained by any single failure but by the interlocking of cultural, structural, institutional, and economic forces that mutually reinforce one another. At the cultural foundation lies what scholars of urban political ecology term environmental casteism: the structurally enforced condition whereby certain bodies bear the ecological burden of a city's waste, upheld by a dogma of destiny that renders this exploitation natural rather than criminal (Kumar & Mishra, 2022). This cultural logic reproduces itself intergenerationally: Dalit children drop out of school and enter the same occupation as their parents, while their families are systematically denied the loans needed to exit it. Above this cultural bedrock, structural mechanisms like informal hiring, semantic evasion, and a financial logic that pays ₹30,00,000 (€30,000) in death compensation rather than ₹1,00,000 (€1,000) for a mechanised motor, sustain the system's daily operation. Yet the research also identifies pressure points where change is beginning: in civic movements demanding data transparency, in engineering initiatives challenging the assumption that human bodies are the only viable sanitation technology, and in legal demands to extend protection to every unprotected sanitation worker regardless of title.

To consolidate these findings into a single analytical model, this chapter constructs a Causal Loop Diagram (CLD) built on two primary sources: data collected during the research phase of this thesis and the methodological framework provided by NPC's Systems Practice Toolkit (NPC, n.d.). The CLD maps the causal relationships between variables in the system, showing how they reinforce or counterbalance one another over time, and where feedback loops lock the system into self-perpetuating cycles. It is organised across five different clusters: Victims, Sanitation Infrastructure, Legal System, Public and Technology, each representing a distinct domain while remaining causally connected to the others. Nodes are coded by type: purple for stakeholders, medium grey for behaviours, and light grey for structural conditions. Arrows indicate the direction of causal influence, with positive links (+) showing that an increase in one variable produces an increase in another, and negative links (-) indicating an inverse relationship. The map should be read from the Victims cluster outward: beginning with the human consequences at the centre, then tracing how each surrounding cluster sustains or compounds them. Its primary limitation is that it draws on activist, journalistic, and civil society perspectives rather than those of government or contractors, and should be read as an advocacy-oriented analytical tool rather than a neutral systems model. The systems map above (Figure 5) consolidates these findings into a single visual model, the analysis of which is developed in the sections that follow.

Feedback loops are places where the output of a process is fed back into the system as input, influencing future action. They contribute to patterns of stability or change, and represent some of the most powerful places for intervention within a system.

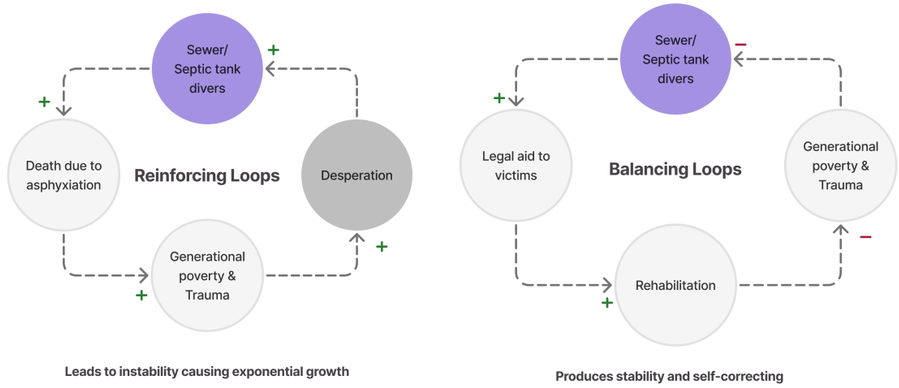


Figure 6: Reinforcing and balancing loops in manual scavenging.
Own illustration based on the Complex Systems Frameworks Collection (Finegood, 2022)

They can be categorised into two types (Figure 6): Reinforcing loops, also known as positive feedback loops and denoted by the letter R, amplify change within a system and lead to escalation if left unchecked. They compound a dynamic in whichever direction it is already moving, producing instability and either exponential growth or decline. Balancing loops, or negative feedback loops, denoted by the letter B, do the opposite. They counteract change and promote stability, working to bring a system back towards a desired state as a self-correcting mechanism. Left unchecked, a reinforcing loop pushes a system further from stability, while a balancing loop works to restore it.

4.1 Existing loops

Across the five clusters of the CLD, five feedback loops emerge, one within each cluster, as the primary mechanisms through which manual scavenging is sustained. Three of them are reinforcing and two are balancing, but none are fully balanced. The reinforcing loops run unchecked, and the two balancing loops are only weakly balancing, slowing the system without ever holding it in equilibrium. Together they form a closed system of perpetuation, in which every node that could trigger accountability is intercepted before it can act. The goal of the analysis that follows is to examine each loop in turn and identify where intervention could make it self-correcting, turning the system's own momentum towards stability.

The Poverty Trap (Victims cluster R1)

The loop begins with the families and children of victims. The death of a breadwinner deepens generational poverty and trauma, which intensifies social exclusion, which produces desperation, which pushes the next generation into sewer and septic tank diving as the only economically accessible option. This generates new deaths, new victims, and new cycles of inherited poverty (Figure 7). The loop does not require coercion to sustain itself; desperation does the work. To balance this loop, effective and meaningful rehabilitation must be provided to the families of victims, breaking the cycle before desperation can return the next generation to the same fatal work.

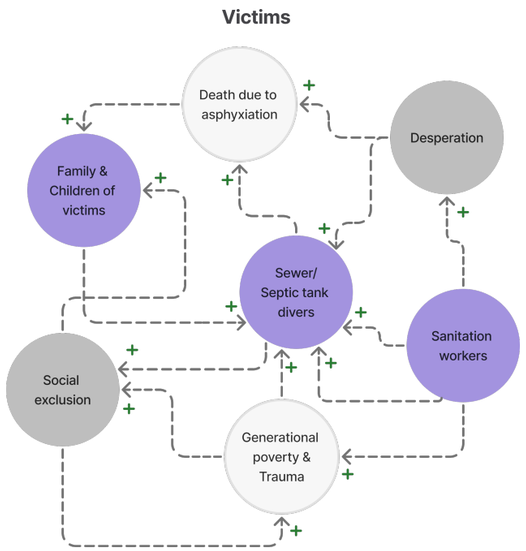


Figure 7: The poverty trap (R1)

The Data Suppression Loop (Legal system cluster R2)

The loop begins with the local government body's manipulation and under-counting of deaths and registered manual scavengers. This deliberate practice gives contractors the cover to operate without accountability, denying workers employee IDs and safety gear, knowing that without identity records, neither their workforce nor its casualties can be officially traced back to them. The absence of IDs and protective equipment produces hazardous working conditions, which generate more deaths, which are in turn under-counted by the same local government body that enabled the conditions in the first place (Figure 8). To balance this loop, mandatory worker registration and transparent death reporting must be enforced independently of the contractors and local bodies who currently benefit from the absence of both.

The Cultural Apathy Loop (Public cluster R3)

The loop begins with caste stigma and the general public's deep-rooted disgust towards waste disposal. Together, these make it culturally acceptable to displace the burden of waste onto a marginalised community, reinforcing a lack of empathy that further normalises their exploitation. This social indifference translates into the physical and mental exclusion of sanitation workers from mainstream society, which deepens caste stigma further and absolves the general public of any individual responsibility for waste management. Poor waste management practices follow, amplifying disgust towards waste disposal, and the cycle continues (Figure 8). To balance this loop, direct public education on waste management and targeted awareness campaigns that humanise sanitation workers and challenge caste-based narratives are needed.

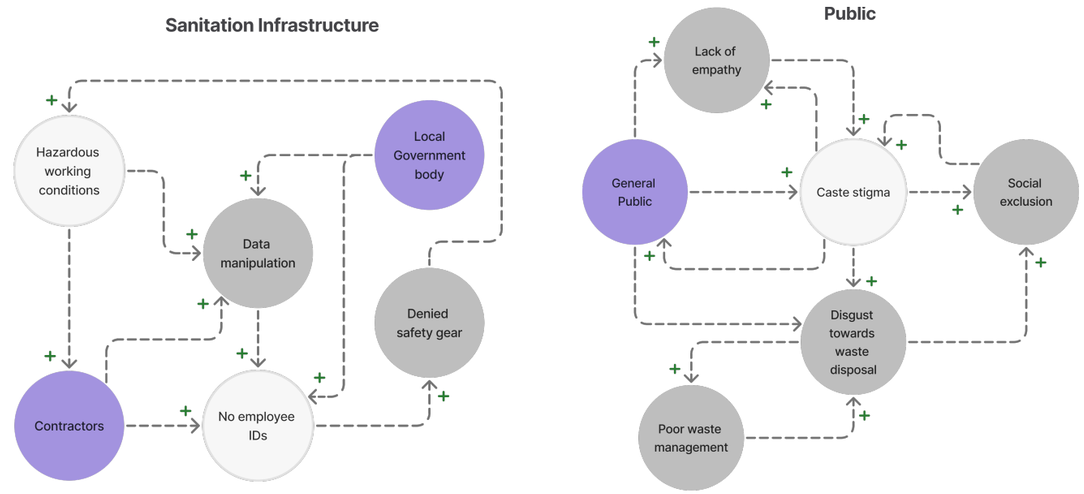


Figure 8: Data suppression loop (R2) and Cultural apathy loop (R3)

The Legal Correction Loop (Legal system cluster B1)

The loop begins with semantic evasion, this reduces public and institutional acknowledgement of the problem, making it easier for the police to facilitate informal compromise between contractors and victims' families before any legal proceedings can begin. Informal settlements suppress PILs, reduce pressure on the courts, and prevent the MS Act from being invoked. The corrective force in this loop comes from legal aid to victims, SKA-filed PILs, High and Supreme Court intervention, and the enforcement of penalties and rehabilitation benefits under the MS Act (Figure 9). In practice, the balancing loop is too weak to overcome them: legal aid arrives too late, after families have already settled; PILs are filed too infrequently to create systemic deterrence; and court-mandated penalties are routinely ignored. To strengthen this loop, legal aid must reach victims before informal compromise takes place.

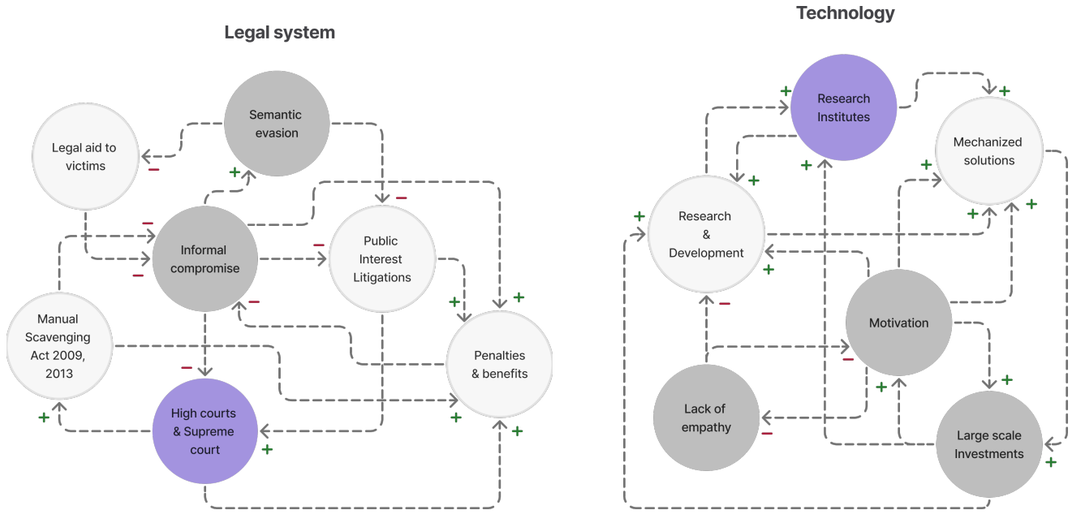


Figure 9: The legal correction Loop (B1) and the technological correction loop (B2)

The Technological Correction Loop (Technology cluster B2)

The loop begins with a lack of empathy and motivation: the absence of public and institutional will to treat sanitation as an engineering problem worth solving. Without motivation, demand for sanitation-focused research and development remains negligible, research institutes dedicated to waste management are scarce, and the pipeline towards mechanised solutions never forms. Where mechanised solutions do exist, they require large-scale investment to be adopted at a practical scale (Figure 9). The corrective potential of this loop is significant: mechanised solutions, if deployed at scale, would eliminate the need for human sewer entry entirely, making the exploitation at the heart of this system structurally redundant. However, this balancing loop is currently the weakest in the entire diagram. Increasing empathy and motivation is therefore the critical entry point.

Leverage points 4.2

The causal loop analysis identifies five leverage points: one for each loop, where targeted intervention is most likely to produce change.

1. For R1, effective and genuine rehabilitation for the families of victims is the entry point, breaking the poverty trap before desperation can return the next generation to the same fatal work.
2. For R2, mandatory worker registration and independent death reporting are the critical nodes, removing the cover that allows contractors to deny identity and safety gear without accountability.
3. For R3, direct public education and awareness campaigns that humanise sanitation workers and challenge caste-based narratives are needed, reducing the stigma that makes collective indifference possible.
4. For B1, legal aid must reach victims before informal compromise takes place, and enforcement of the MS Act must be made independent of the local bodies that currently benefit from its non-application.
5. For B2, increasing motivation and empathy is the entry point that sets the entire technological loop in motion. This will drive investment, research institutions, and the mechanised alternatives that no legislative reform can deliver.

Across all five loops, the Safai Karmachari Andolan is the only node that bridges field-level documentation to courts and parliament, strengthening SKA's capacity to generate reliable, attributed, real-time data. The employee records, case files, and benefits calculations would make its death counts legally actionable rather than merely credible. This simultaneously activates leverage points across R1, R2, and B1. This is the foundation on which the proposed intervention in Chapter 5 is built.

5 Designing intervention



Identifying the leverage points within the system raised an immediate design challenge: which intervention, realistically within the scope of this project, could activate the most of them simultaneously? The first step was idea generation and the early ideas, while grounded in the analysis, each revealed a fundamental limitation upon closer examination.

Three initial interventions were considered. The first was an interactive storytelling playbook about caste for children, rooted in the observation that adults with fully formed beliefs and opinions are difficult to reach, making children and young adults a more receptive audience for shifting cultural narratives around caste and sanitation. The second was an advertising campaign promoting modernised waste management practices. The third was a series of learning modules or a university programme dedicated to sanitation studies. Each idea addressed a real node in the system: R3's cultural apathy, B2's technological vacuum, and the long-term need for public education.

However, all three shared the same fundamental problem: they created a foundation and a space, hoping that someone else would use it to produce change. The storytelling playbook and ad campaign could shift attitudes over time but offered nothing to the workers dying now. The university modules were more actionable but moved the project away from the victims and their families. The turning point came from a question posed by my supervisors during a project review: *who are you designing for?* That question reoriented the entire project. Rather than designing for a general audience and hoping the effects would eventually reach sanitation workers, the intervention needed to place those workers at the centre.

Mapping the stakeholders made the answer clear. The Safai Karmachari Andolan occupied a unique position in the system: simultaneously approachable by the public, credible to academic researchers, connected to a network of legal representatives, and most critically holding a direct access to victims and their families across twenty-five states. Designing something that made SKA's work easier, more streamlined, and more accessible to the people was the highest-leverage available.

The immediate response was a digital data management platform. But as the design developed, it evolved into something more participatory: a system through which workers could register themselves, validate their own existence, and receive something tangible in return, guidance on legal entitlements, safety information, and a formal record that could not be erased by a contractor or ignored by a municipality. From this foundation, features were added iteratively by returning to the nodes of the causal loop diagram.

The result is Saatchi, (meaning witness in Tamil) a name that captures the platform's core purpose: to see, record, and formally acknowledge the existence of those the system has made invisible. Its logo depicts three hands joined to form the silhouette of a heart, representing the three parties whose convergence the platform is designed to enable: the victims and their families, the public, and the government. The proposition is that manual scavenging cannot be eradicated by any one of them alone; it requires all three. Saatchi is a prototype of how such a platform might function if developed and published jointly with SKA (Appendix E). SKA will be bringing the legal expertise, local chapters, and existing worker relationships with Saatchi providing the interface, documentation infrastructure, and educational layer. The website is structured around four core sections: Register, Saatchi Kit, Legal Aid, and Courses. Each section addresses a distinct leverage point in the system, and explained in detail in the sections that follow.

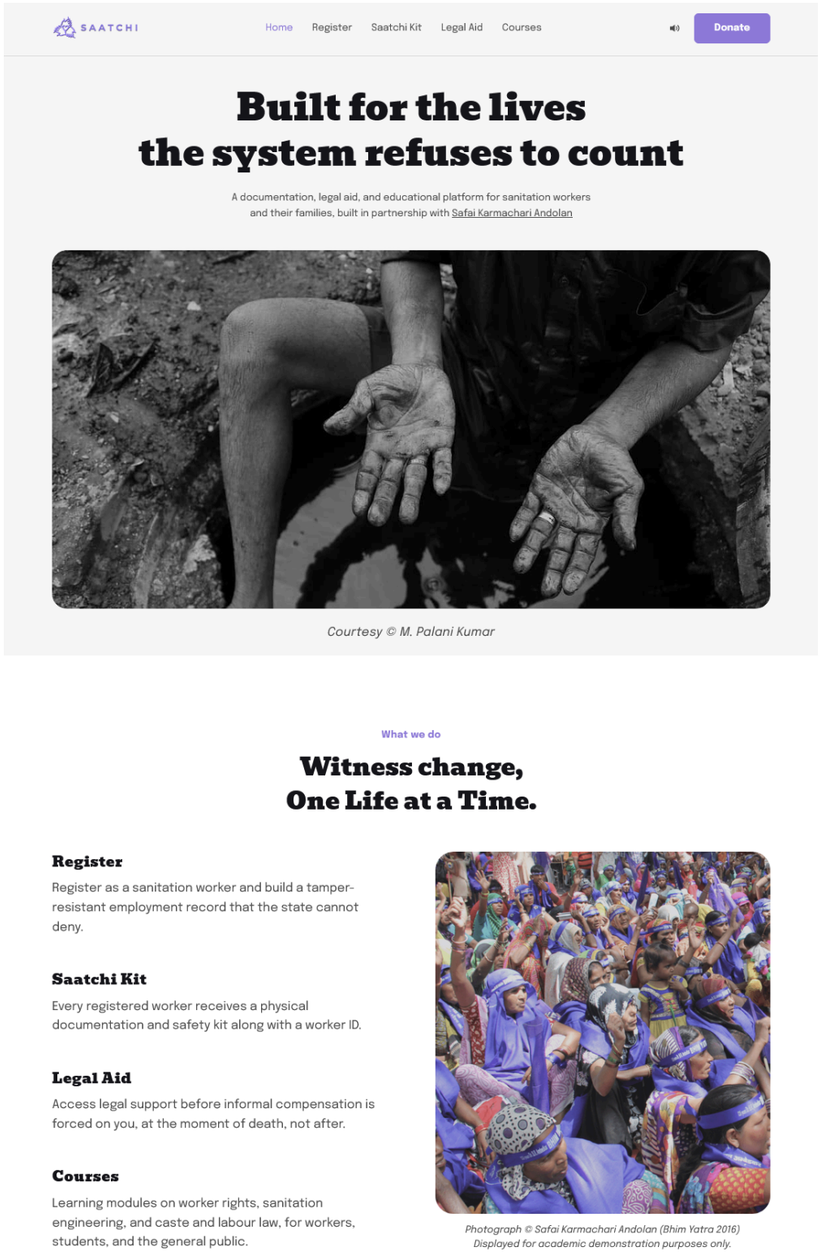


Figure 10: Homepage of Saatchi

Registration

5.1

The registration flow has three steps. First, the worker identifies which of three categories applies to them: sewer or septic tank worker, sanitation worker, or waste picker. This determines which government schemes and legal entitlements are surfaced throughout their use of the platform. The second step collects personal details like name, location, employer, and identity information. The third step records an emergency contact. This contact is notified upon registration and becomes the first point of communication if an incident is reported.

On submission, a Saatchi ID is generated immediately and a Saatchi Kit is allocated for that ID. The ID is issued by SKA as a registered society, a model precedented by the Aajeevika Bureau in Rajasthan, where the State Labour Department authorised a non-governmental organisation to issue worker identity cards co-signed at the village level for verification. Saatchi follows this structure: the ID is supported by SKA, self-registered on issue, and upgrades to community attested, once a colleague or field worker confirms the registration.

In parallel, an e-Shram application is initiated on the worker's behalf. The e-Shram ID is issued by the Ministry of Labour and Employment and is the government's mechanism for formal recognition of unorganised workers. It includes ₹2,00,000 (€2,000) in accident insurance cover and eligibility for a ₹3,000 (€30) monthly pension from age 60. Workers who provide Aadhaar during registration have their e-Shram enrollment completed directly; those who do not are guided to the nearest Common Service Centre with the support of SKA.

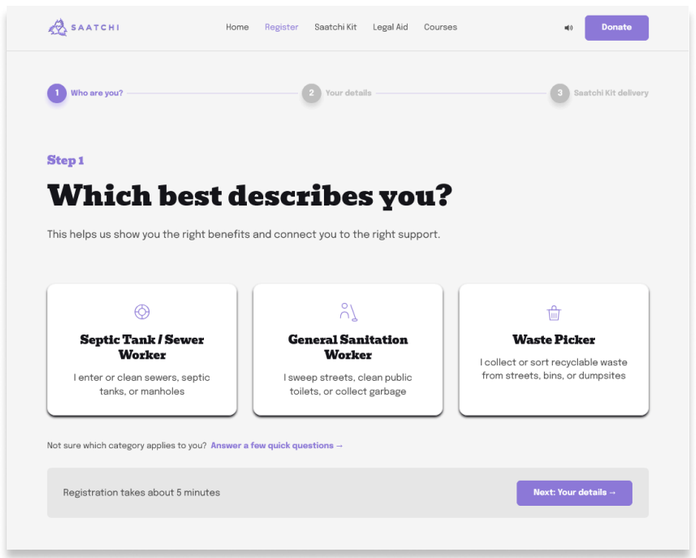


Figure 11: Step 1 of Registration in Saatchi

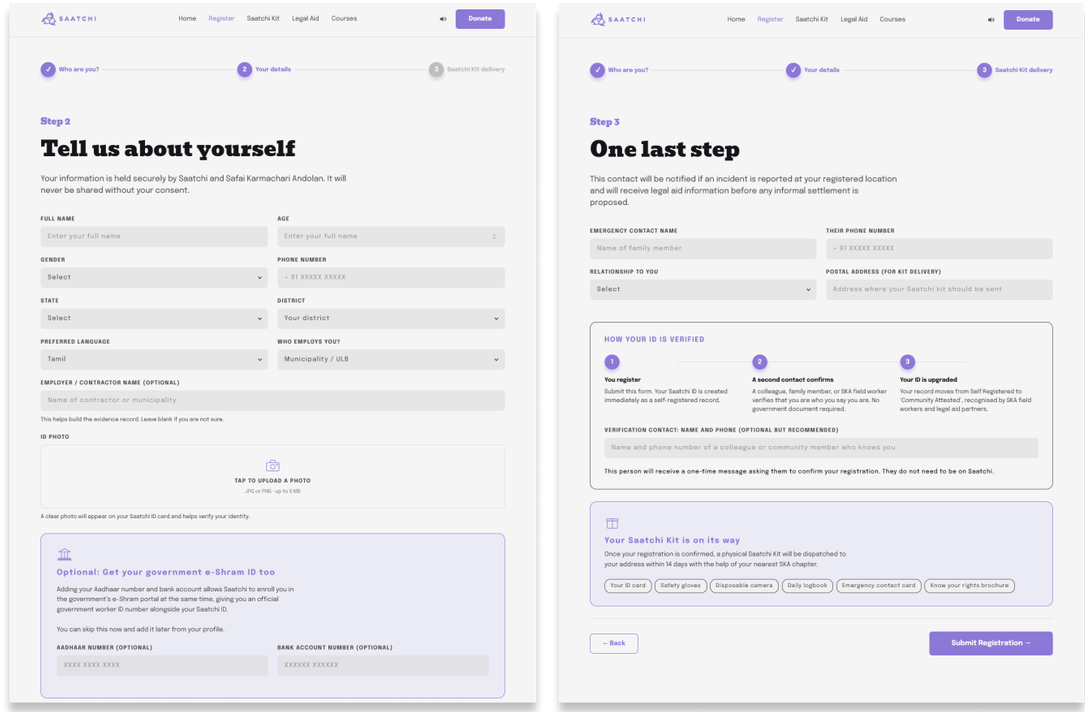


Figure 12: Step 2 and 3 of Registration in Saatchi

5.2

The Saatchi kit

Every registered worker receives a physical Saatchi Kit within 14 days, dispatched free of charge through their nearest SKA chapter. The kit is not only a symbolic gesture, each item inside it is a direct response to a specific failure identified in the loop analysis, designed to give workers something concrete before anything goes wrong.

The Saatchi ID card is the foundation of everything else in the kit. It is the physical manifestation of the registration process, a laminated card carrying the worker's name, unique Saatchi ID, and a bar code linking to their full record. For workers whose employers provide no employment documentation of their own, this card is the first formal proof that they exist, that they work, and that they have rights. It is the node that directly addresses R2's data suppression loop: a record that cannot be denied by a contractor or erased by a municipality.

The Safety gloves carry both a practical and symbolic purpose. Practically, they respond to a reality documented across the expert interviews: the majority of sanitation workers who sweep streets, collect garbage, and clean public toilets do so with their bare hands. The MS Act 2013 mandates 44 items of protective equipment for workers deployed near sewers or septic tanks; in practice, none of it is provided. The gloves are not intended to encourage more people into this work, nor to suggest that a single item of PPE is sufficient. Instead they make a statement to workers already being forced into it: Saatchi sees you and stands with you. The choice of gloves specifically is deliberate. One of the three hands in the Saatchi logo represents the sanitation worker; the glove is Saatchi's way of protecting it.

The Disposable camera carries an investigative agenda. Each camera is stamped with the worker's unique Saatchi ID before dispatch, linking every photograph directly to their identity record. Workers are instructed to photograph their working conditions like sewer entry points, absent PPE, unsafe sites, any incident on the job. When the roll is complete, the camera is deposited at the nearest SKA office, developed, and the images are added to the worker's evidence file. The decision to put the camera in the worker's hands rather than relying on third-party documentation is intentional: it is the worker themselves who files the evidence of the injustice done to them, making it more credible, more personal, and harder to dismiss.

The Daily logbook is a 90-page written record of work location, hours, payments received, equipment issued, and any incidents on site. Where the ID card establishes identity and the camera captures conditions, the logbook creates continuity. A dated, cumulative paper trail that can corroborate a legal claim and demonstrate a pattern of violations over time.

The Emergency contact card is a pocket-sized card carrying five numbers: the SKA legal helpline, regional coordinator, labour court, district magistrate office, and police complaint line. It is designed for the moment of crisis when a worker is injured, when a colleague dies, when a contractor makes a threat, ensuring that the right contact is always reachable, even without internet access.

The Know Your Rights brochure summarizes the worker's legal entitlements under the MS Act 2013, tailored to their category of work: septic tank and sewer worker, general sanitation worker, or waste picker. It consolidates what the law guarantees them: the PPE they are owed, the compensation they are entitled to, and what is illegal for an employer to do. It is the legal system made legible, in a form that can be kept and shared.

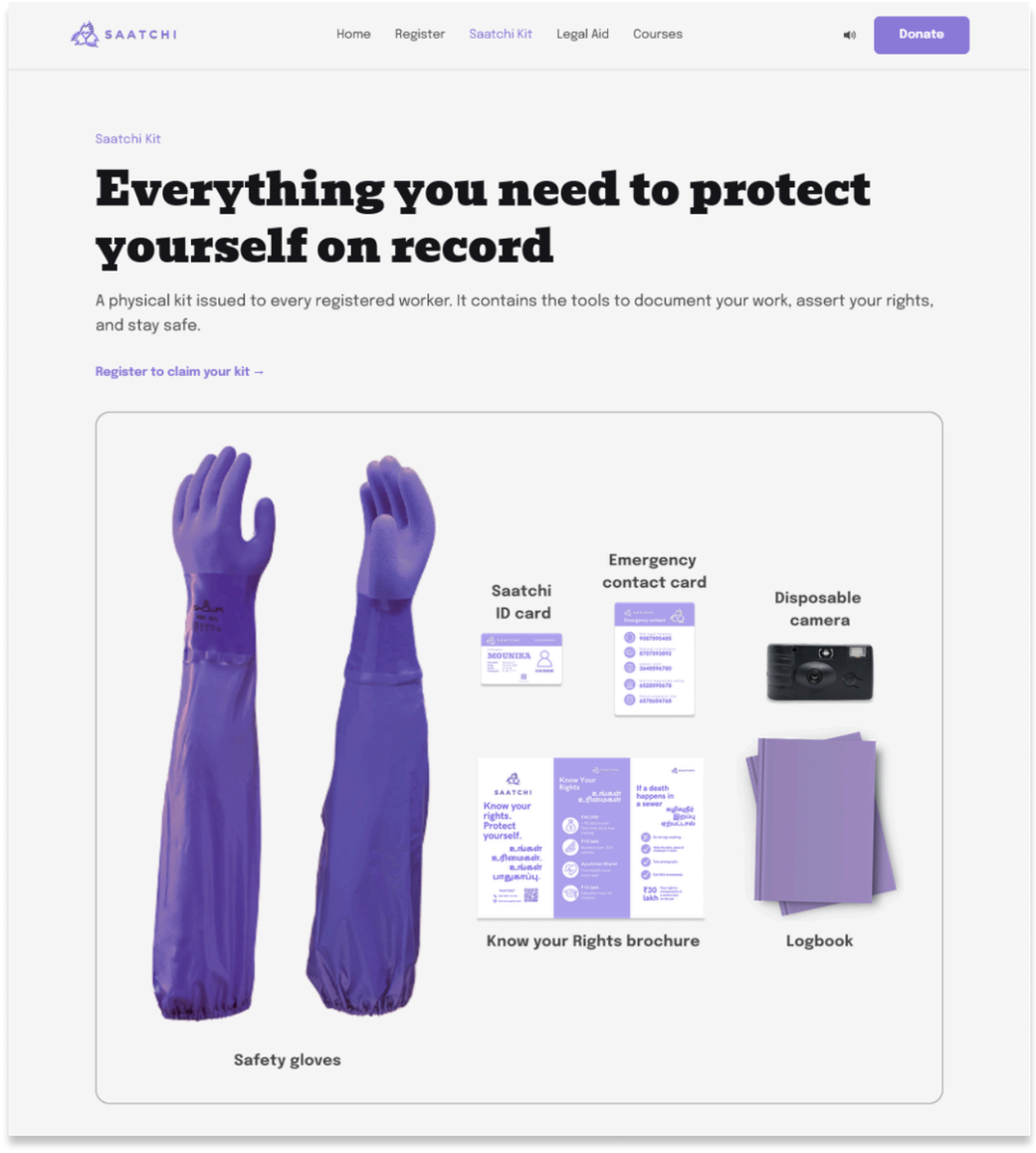


Figure 13: The Saatchi kit

5.3 Legal aid

The legal aid section of the platform is designed to channel workers and families into the existing infrastructure by removing the barrier of not knowing it exists, or not knowing what they are entitled to before they engage with it. Saatchi does not provide legal representation, SKA already does.

The section covers three audiences. For workers: the full list of entitlements under the MS Act 2013 and SRMS scheme, including the ₹40,000 (one-time cash assistance), free skill training with ₹3,000/month stipend, business loan with 50% subsidy, five years of Ayushman Bharat health coverage, and education loans for children up to ₹10,00,000 (€10,000). For families of deceased workers: step-by-step guidance beginning with a single instruction, do not sign anything. Followed by how to document the incident and how to reach SKA legal support before any settlement negotiation begins. The Supreme Court ruled in 2023 (Dr. Balram Singh vs Union of India) that the mandatory compensation for a sewer death is ₹30,00,000 (€30,000); the section makes this number visible and legible. For employers: the obligations under the Act and the criminal penalties for non-compliance, including up to five years imprisonment and mandatory compensation if a worker dies.

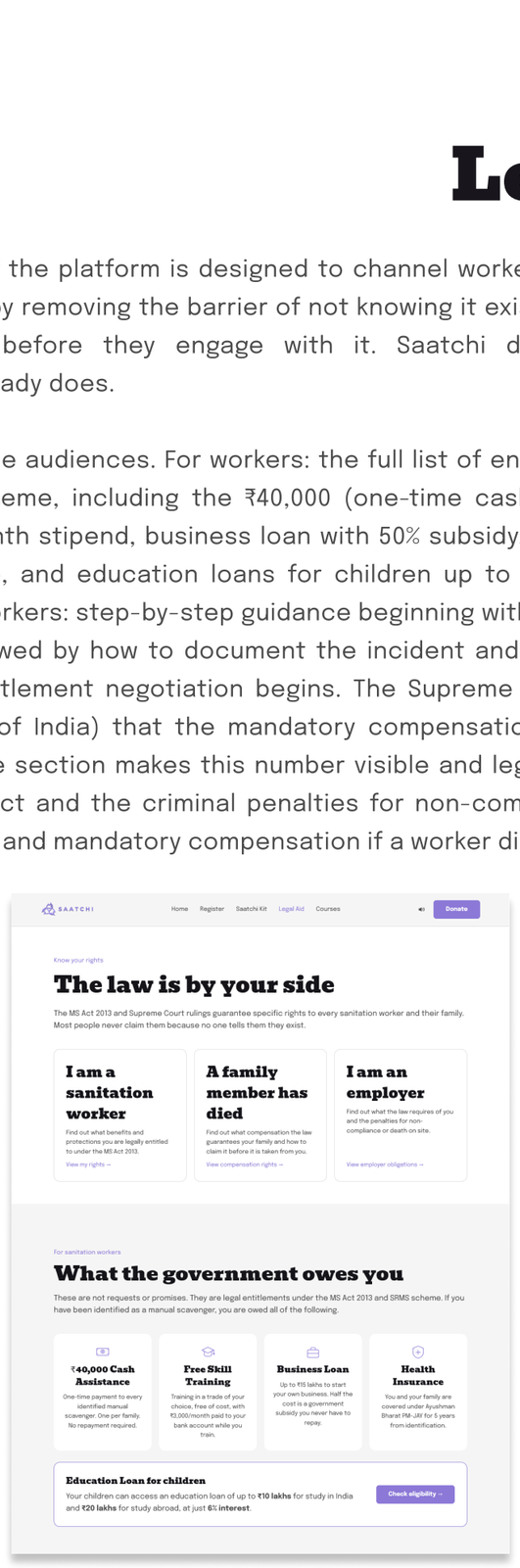


Figure 14: Know your rights section of Legal aid

5.4 Courses

The final section is designed in two parts. The first part is more of a design proposal rather than a prototype. It is a series of animated educational videos for school-age children and young adults produced to explain how urban sewage systems, sanitation networks, and waste management infrastructure work. The content draws on the Sanitary Engineering open courseware from TU Delft, adapted into short, accessible episodes organised into four thematic series: how water moves through a city, what lives underground, how wastewater is treated before it re-enters the environment, and how cities design for better sanitation. Small case challenges are embedded in each series to stimulate engagement and application. The audience is not sanitation workers but the next generation of urban planners, engineers, and advocates.

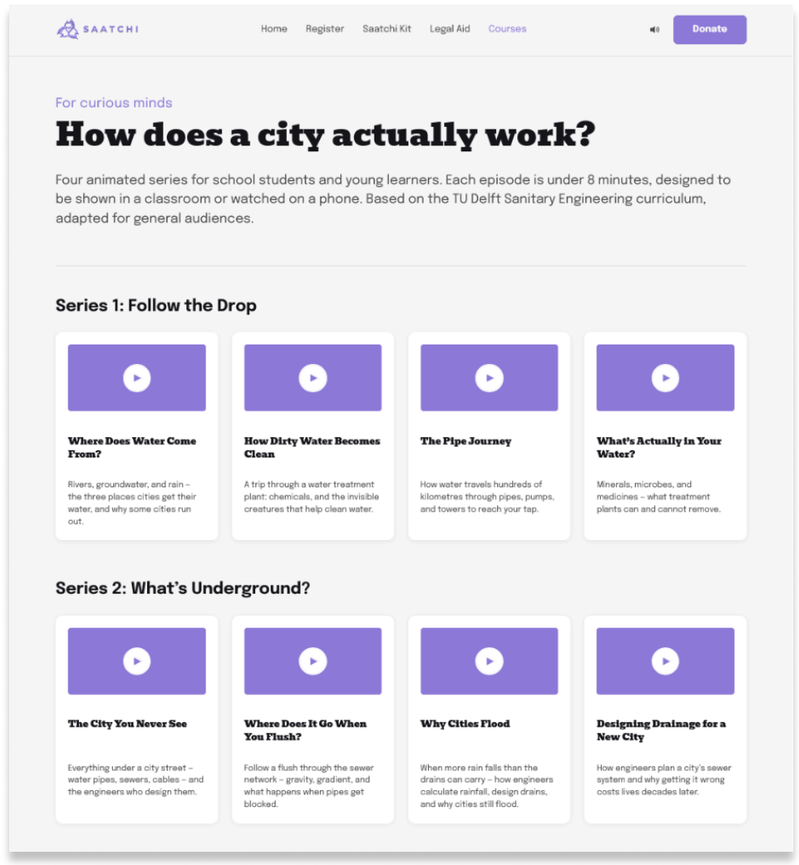


Figure 15: Courses section of Saatchi

The second part is a direct-access sources library. Every claim on the platform, every figure, every legal entitlement, every penalty links to its primary source. The library is organised into four categories: legislation (MS Act 2013, PE Act 1993), Supreme Court orders (including Safai Karamchari Andolan vs Union of India, 2014, and Dr. Balram Singh vs Union of India, 2023), government scheme documentation (SRMS, NAMASTE, VISVAS, e-Shram, Ayushman Bharat), and data and reports (NCSK annual reports, NFHS, SBM implementation data). All sources are publicly available on government websites and are linked directly.

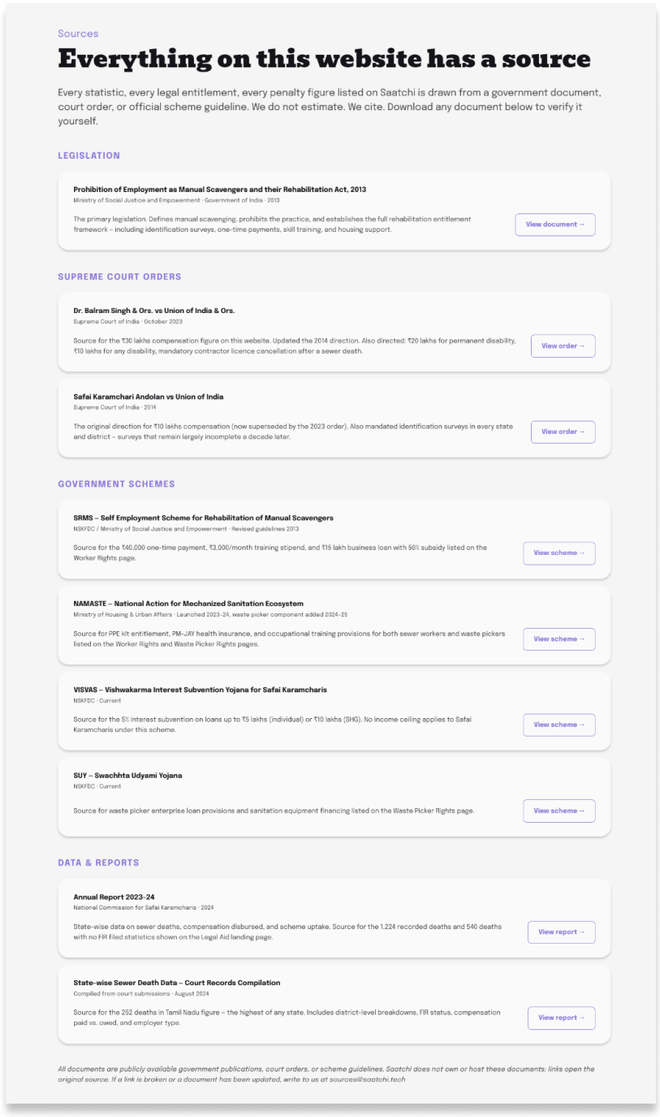


Figure 16: Sources section of Saatchi

6 Projected impact

Zooming out from the intervention and looking into the future, the effects of Saatchi at its best can be forecast through an outcome map. It is a tool that connects a programme's activities to its desired system impacts through a single integrated roadmap (Jones & Van Ael). The outcome map (Figure 17) traces that trajectory for Saatchi, from immediate outputs of specific causal loop nodes, converging on a pivotal shift, from which long-term effects across the system unfold.

In the technology cluster, R&D institutions that previously had no attributed data gain access to a growing, documented record of working conditions, deaths, and contractor behaviour. Sanitation-specific research programmes follow, and with them large-scale investment in mechanised solutions. It is not because attitudes changed first, but because the legal and evidential cost of not investing has risen.

In the victim cluster, the effects are generational. Workers who exit the occupation carry documented work histories, opening access to formal employment, retraining, and credit previously inaccessible to people the system had never recorded. Their children, no longer tied to an inherited occupation, access education outside it. The poverty cycle does not break all at once, but it breaks for the families the system can now see.

In the sanitation infrastructure cluster, contractor impunity erodes as attributed evidence enables prosecution. Municipalities begin to face legal, political, and financial mandates to procure mechanised equipment. The infrastructure of the occupation starts to disappear.

In the public and stigma cluster, mass media begins to reframe sanitation as a civic responsibility rather than a caste duty. Workers with a legal identity are harder to render invisible. Caste stigma does not dissolve, but its grip weakens when the people it targets are no longer undocumented.

In the legal cluster, the pattern of informal compromise like settlements before cases reach court, suppressions before FIRs are filed, are interrupted. High courts receive attributed evidence for the first time, and the rulings that follow create precedent. These effects do not follow automatically from the intervention. The assumptions Saatchi rests on are examined in the following section, along with the conditions under which this chain of causation holds.

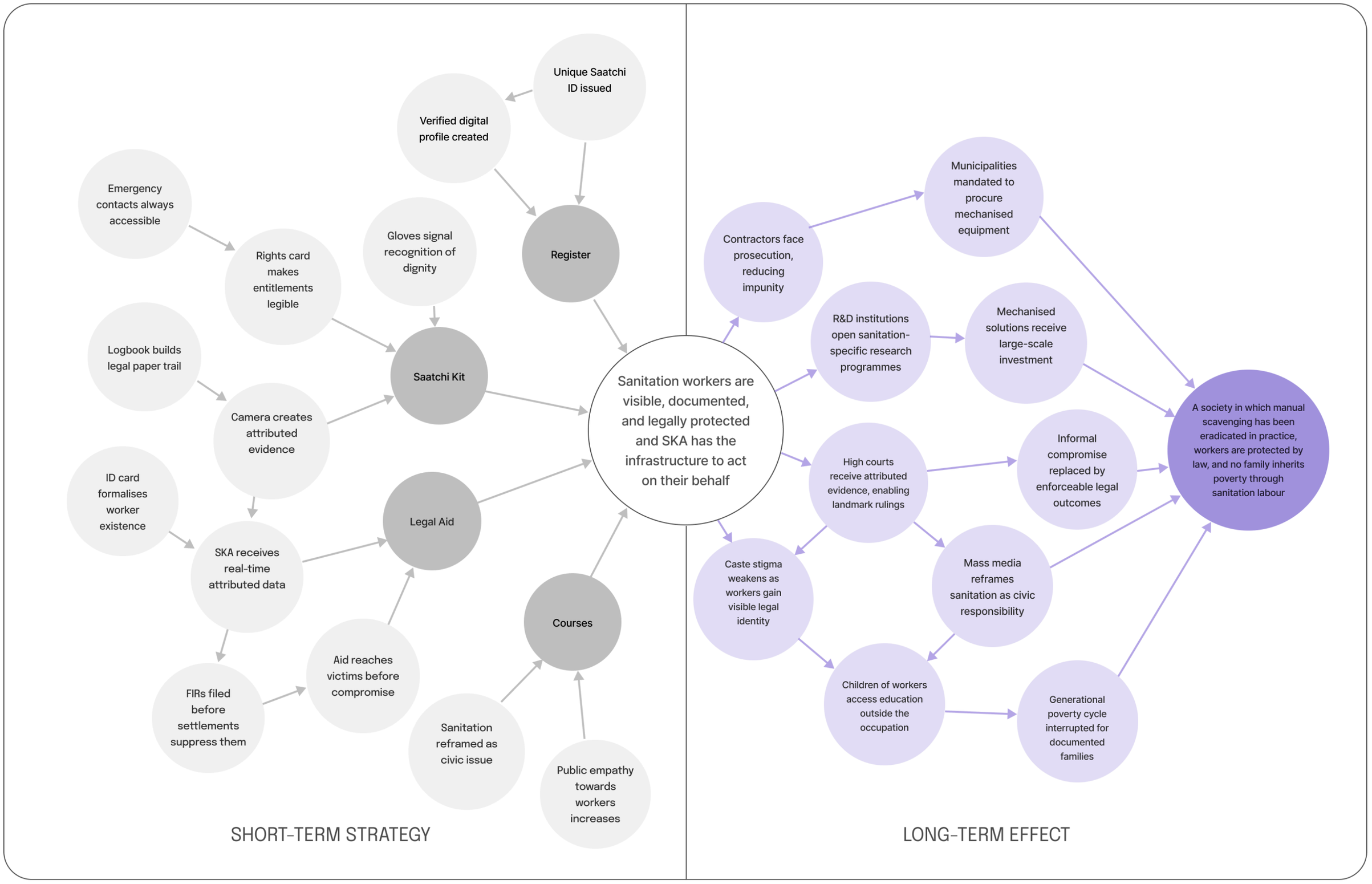


Figure 17: Outcome Map

Assumptions 6.1

The current prototype is built in English for the purposes of this project. It is assumed that a public-facing pilot would launch first in Tamil, before expanding into other regional languages. Audio features would also be introduced to accommodate workers who cannot read, ensuring that literacy is not a barrier to registration or access.

The platform assumes that users have access to the internet and a device: a smartphone or a computer. This is not a given for the majority of sanitation workers. The assumption here is that SKA's existing field volunteers, who already work closely with these communities at a micro level, would guide workers through the registration process and provide assisted access where needed. Although Saatchi is designed as a self-registration platform, it is acknowledged that for the pilot and likely beyond it, some degree of SKA support will be required to make registration accessible in practice.

It is assumed that Saatchi operates entirely within SKA's existing infrastructure. The kits are financed through a combination of donations, crowdfunding, and SKA's existing resources, with a built-in donation feature through which members of the public can contribute directly. The legal support channelled through the Legal Aid section draws on SKA's existing network of legal representatives. Saatchi does not create new funding mechanisms or new legal infrastructure. It makes what SKA already has more streamlined, more accessible, and more legally actionable.

6.2 Limitations & risks

The legal aid section redirects workers and families towards SKA's legal network and the MS Act 2013, but enforcement remains within the jurisdiction of courts and the state. Saatchi can ensure a case is better evidenced; it cannot ensure a judge invokes the Act, a municipality complies, or a contractor faces prosecution. The legal correction loop Saatchi is designed to strengthen is ultimately dependent on the same institutions whose failure this thesis documents.

Saatchi also redirects families towards rehabilitation entitlements but whether that rehabilitation is adequate to break the poverty trap is a question beyond the platform's scope, requiring parallel policy intervention to resolve.

A more immediate risk concerns the workers themselves. Registration creates a formal record of a worker's identity, employer, and working conditions. While this is the foundation of the platform's value, a worker's engagement with Saatchi could carry informal consequences like retaliation from employers. This is not a reason to avoid documentation; it is a reason to handle data carefully and securely, and to ensure that discretion is maintained throughout every stage of registration and advocacy work.

Finally, Saatchi is a prototype developed within the constraints of a single research project. Its viability at scale has not been tested, the community attestation model assumes an active SKA presence that may not always exist, and long-term sustainability depends on consistent funding and SKA's continued institutional capacity.

Stakeholder validation 7

SKA's Founder:

The prototype was presented to the founder of the Safai Karmachari Andolan, whose response affirmed the platform's core direction while identifying one significant legal risk about the Saatchi ID. The MS Act 2013 explicitly prohibits the employment of manual scavengers, meaning that issuing workers a formal ID card that validates their employment in manual scavenging could expose both Saatchi and SKA to a charge of non-compliance with the legislation. If the government's official position is that manual scavenging does not exist and is illegal, then formally documenting workers as manual scavengers creates a legal liability for the organisations issuing those records.
The founder's suggested resolution was to reframe the ID not as an employment document but as a membership record, positioning registered workers as members of a collective rather than formally employed individuals in a prohibited occupation. Resolving this would be the immediate next step before any pilot could be developed with SKA.

SKA's National Convenor:

The full report was shared with the National Convenor of the Safai Karmachari Andolan, whose response affirmed both the analysis and the concept while offering substantive corrections to the pre-design findings.

She was particularly struck by the term "semantic evasion," recognising it immediately as the phenomenon SKA describes as "deliberate denial."

Her principal critique concerned the report's framing of the system as entirely non-functional. She argued for a more nuanced position: in Tamil Nadu, every sewer death is investigated, and where incidents are not classified as water tank accidents, the MS Act 2013 is invoked in most cases and compensation is deployed. The failure, in her view, operates at the national scale, where large numbers of victims have never been enumerated under the Act and therefore receive no benefits.

The core problem is one of visibility; because manual scavengers remain invisible to the state, the Act is not invoked on their behalf. Where SKA actively demands its invocation, it is mostly enforced in several states. At the same time, she noted a growing tendency in Parliament to reframe these deaths as "accidents" or "hazardous deaths," a linguistic shift that echoes the report's analysis of semantic evasion. She also restated SKA's foundational goal, following Ambedkar: to delink caste from the occupation, secure an apology from the Prime Minister, and establish dignified livelihoods for sanitation workers.

Her most specific feedback concerned the Saatchi kit, particularly the gloves. Issuing protective equipment, she cautioned, risks positioning the work as carrying a privilege or reward, which could encourage people to enter or remain in the occupation. The goal is not to make workers proud of the work but to transform it from a traditional caste-bound practice into a technical, professional occupation. The emergency card and the know-your-rights card, by contrast, she considered genuinely useful.

8 Conclusion

The feedback from SKA, the intended end users of this intervention, makes one thing evident: a digital database and interactive platform of this kind is genuinely required, and the concept has been appreciated and validated by the very organisation best positioned to judge it. What their responses equally make clear, however, is that every feature added to such a platform carries an impact larger than itself. For example, the gloves were intended to empower those who suffer this work, but it is now evident that they could create a very different effect; in this case, impact outweighs intent.

Both concerns raised, reframing the ID as a membership record of a collective and reconsidering the gloves so the kit does not appear to promote the occupation, will be addressed before any pilot is launched or the website is made public. Although SKA is not the official client of this project, the intervention is heavily dependent on their operational network and existing resources. This work is therefore treated as a conceptual proposal to SKA: should they be interested, it will be developed further into a pilot and subsequently into a functioning website.

Before this report is concluded, one position must be clearly established: from the beginning of this project, the goal has been the complete eradication of manual scavenging. No human being should have to go through what these workers go through, and that position remains unchanged. None of the design solutions proposed here are intended to endorse or encourage anyone into this field of work.

It is the duty of the government to separate sanitation workers from human waste entirely, to give them complete protection from the hazardous environments they work in, and to recognise them as civil employees of the state. They deserve every worker's right, benefit, insurance, and pension, because they place their health at risk in service of everyone else. That said, the public plays an equally active role in stigmatising caste and waste management. The first step toward destigmatisation is for every individual to take responsibility for the waste they produce. This website was deliberately built with no incentive or benefit for the public, because this responsibility is theirs in the first place. The way forward is a civil movement: active public involvement in SKA's demonstrations, creating awareness, and questioning unfair working conditions, instead of adding to their suffering.

This report closes by recognising every sanitation worker and manual scavenger in India. Their labour has kept cities running for generations, and the burden was never theirs to carry. The debt is owed by the State and by every citizen it serves, and this project exists to demand that it finally be paid. Eradication is not an aspiration; it is the only acceptable outcome.

8.1 Reflection

When this project began, manual scavenging felt like a problem too large to design for. I did not see a solution, and the early research findings genuinely took me aback. What grounded me was the act of mapping itself: the more I researched and structured the system, the more confident I became that the complexity could be navigated, even if it could not be solved outright.

On methodology, the Systemic Design Toolkit proved a very useful instrument when used the right way, particularly in co-design settings or group work. The first two phases were highly valuable for my project, but using all seven stages was impossible within a thesis conducted largely alone. This taught me something important: every tool, at every stage, needs to be customised to the case at hand. The combination of different research methods served me far better than strict adherence to a single framework would have.

In the third and fourth stages especially, I felt the toolkit would have been more effective as a co-design workshop, something that became increasingly evident as I read *Design Journeys through Complex Systems* (Jones & Van Ael). It is safe to say the tools are much easier to navigate once you have read the book behind them. Given the time constraints and my limited personal access to stakeholders, I worked with what was possible.

Changing my methodology mid-project was the turning point. I had been focusing so heavily on research that I had not realised it was time to start designing. That was when I turned to Causal Loop Modelling, which I now see as the quickest way to identify leverage points, though not necessarily the easiest. Translating research findings into carefully curated networks, following threads and identifying loops, was probably the hardest part of the entire project. Once that was done, most of the difficulty was behind me.

To future systemic designers, I would say this: it is okay to keep iterating not only your solution but your methodology. When a method is not contributing enough, it is okay to look for other options. Systemic design is vast and full of possibilities, every system is uniquely complicated, and what works for one case will not necessarily work for another. That said, if I were to start over, I would choose the same methodology again, because of everything the process itself taught me. If I could do one thing differently, I would have co-designed the features of the intervention together with SKA and tested a pilot, had the time and resources allowed it.

Somewhere in the middle of the loops and maps, this stopped being a thesis and became a responsibility. I am very proud of the result, but prouder of what it taught me. I hope it travels far enough to matter to the people it was built for.

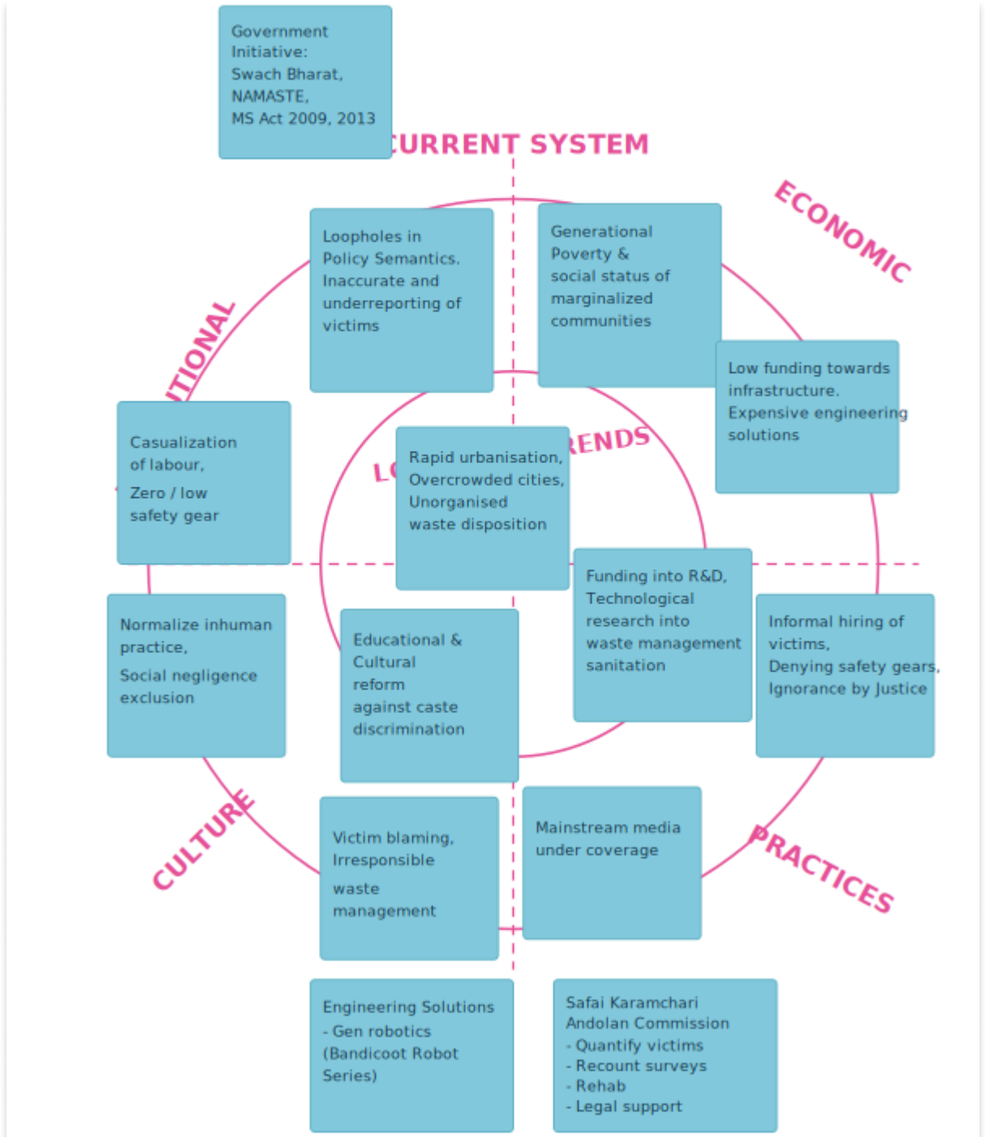
Visit the Saatchi website
Username: examiner
Password: saatchi

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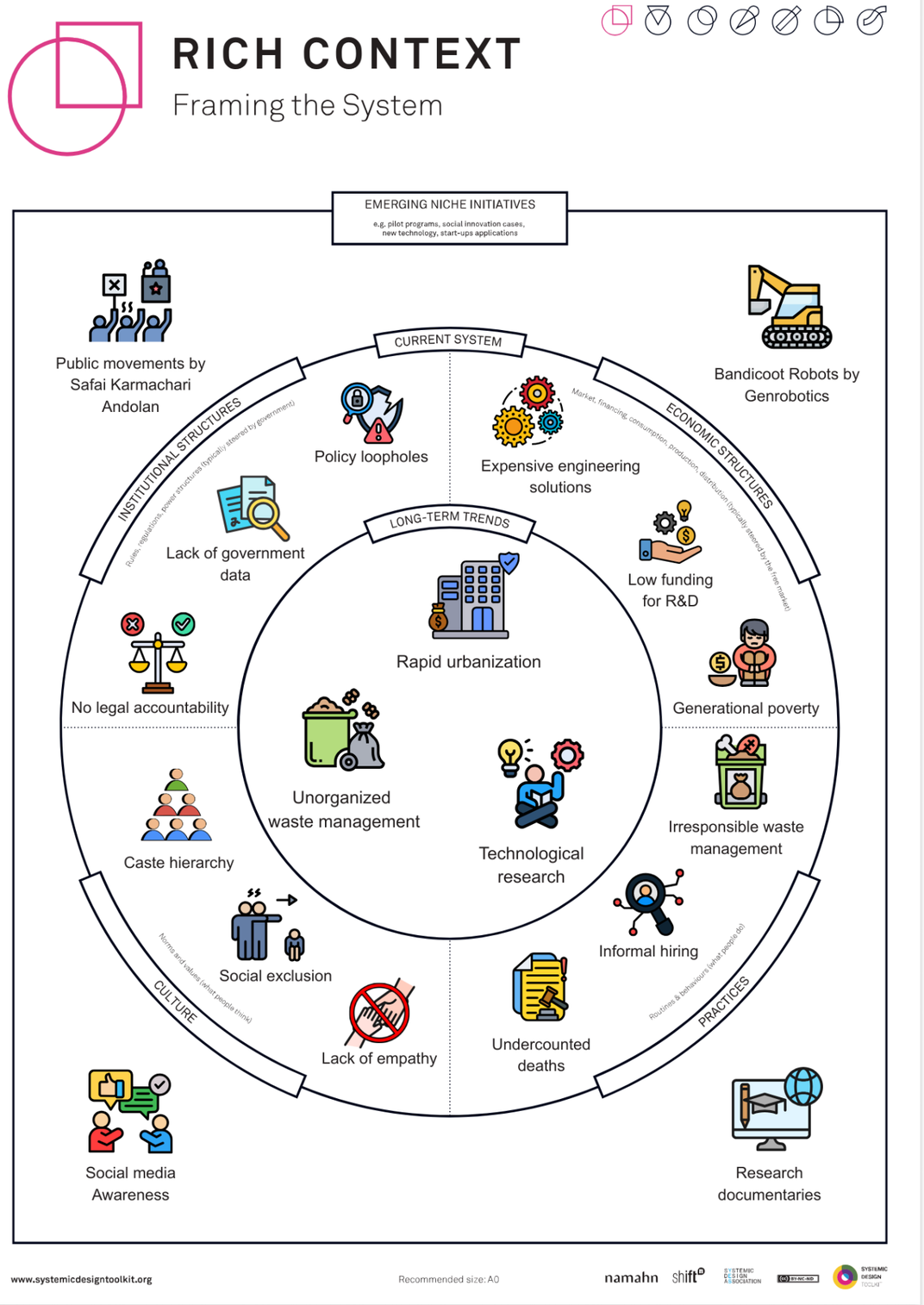
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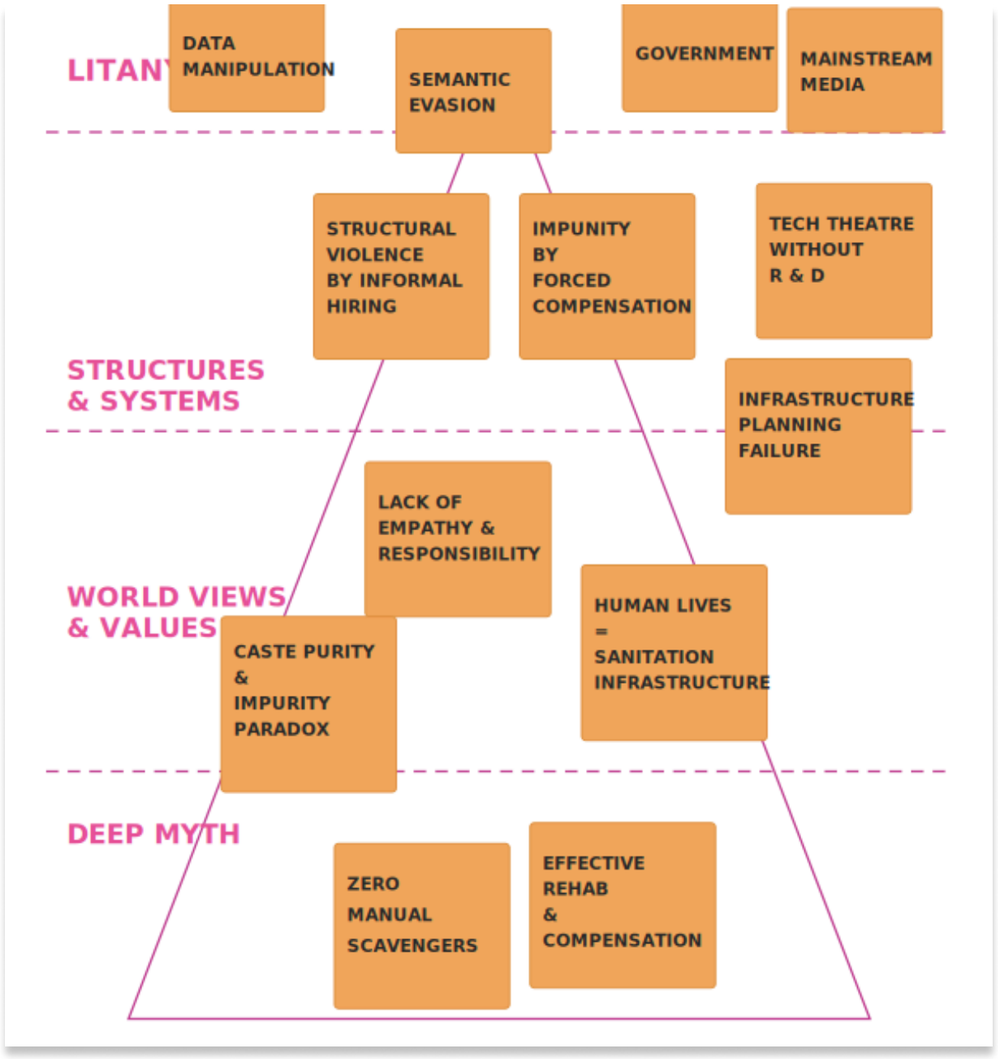
Appendix A : Analysis

This section documents the working process behind the analysis, including stages that were explored and then set aside. The visual artifacts are rendered versions of the brainstorming boards and sketches.

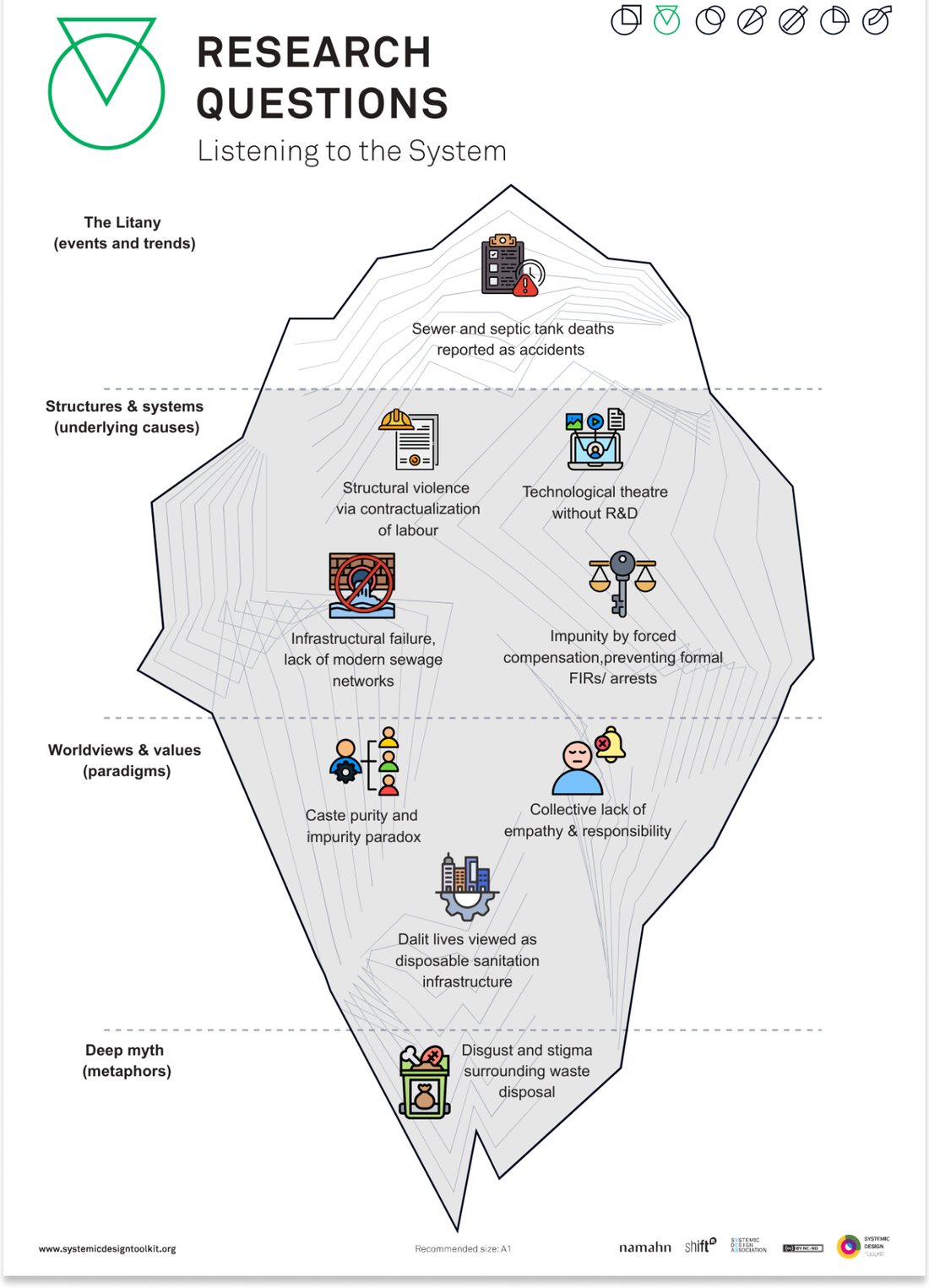


Step 1: Rich Context mapping



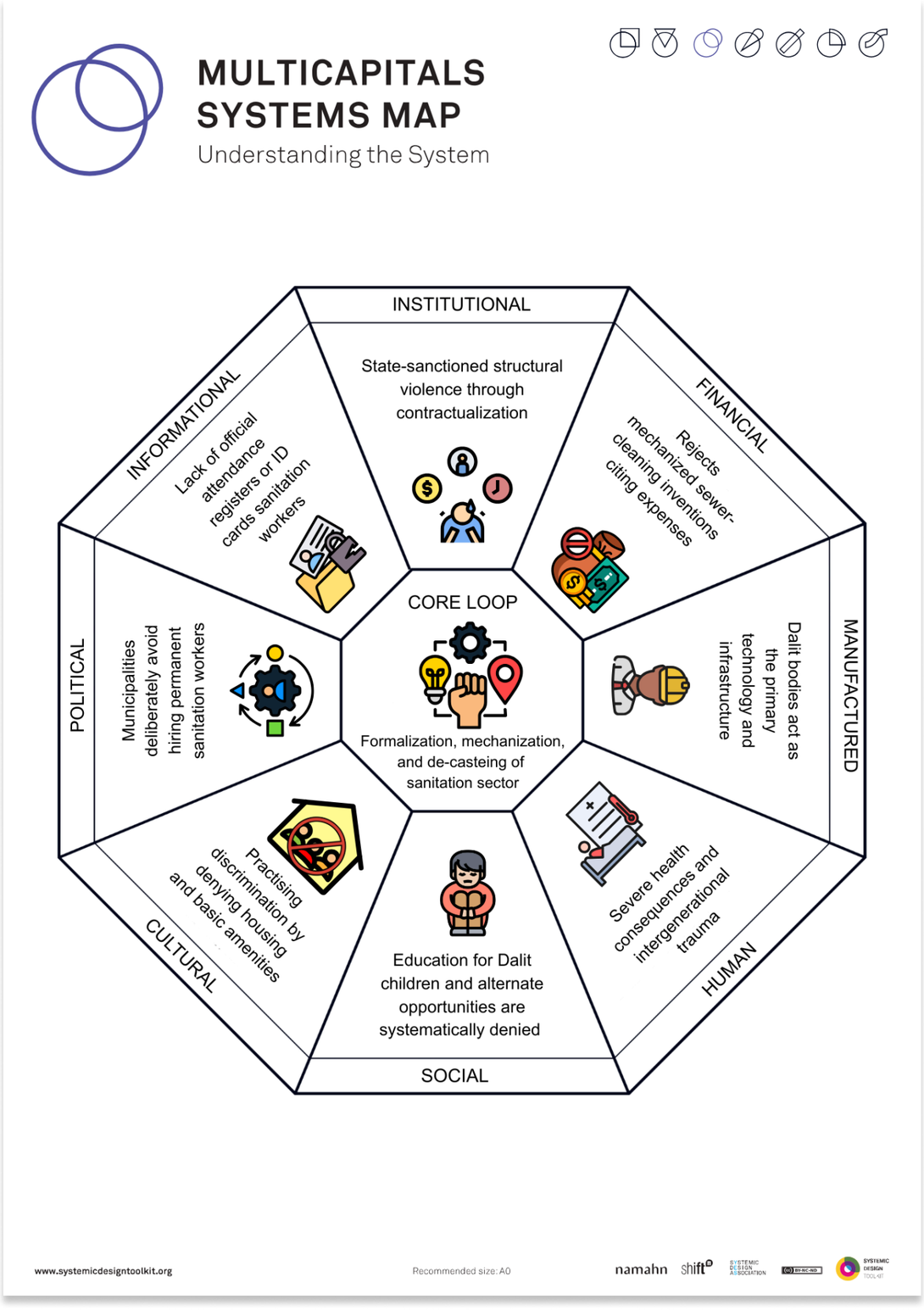


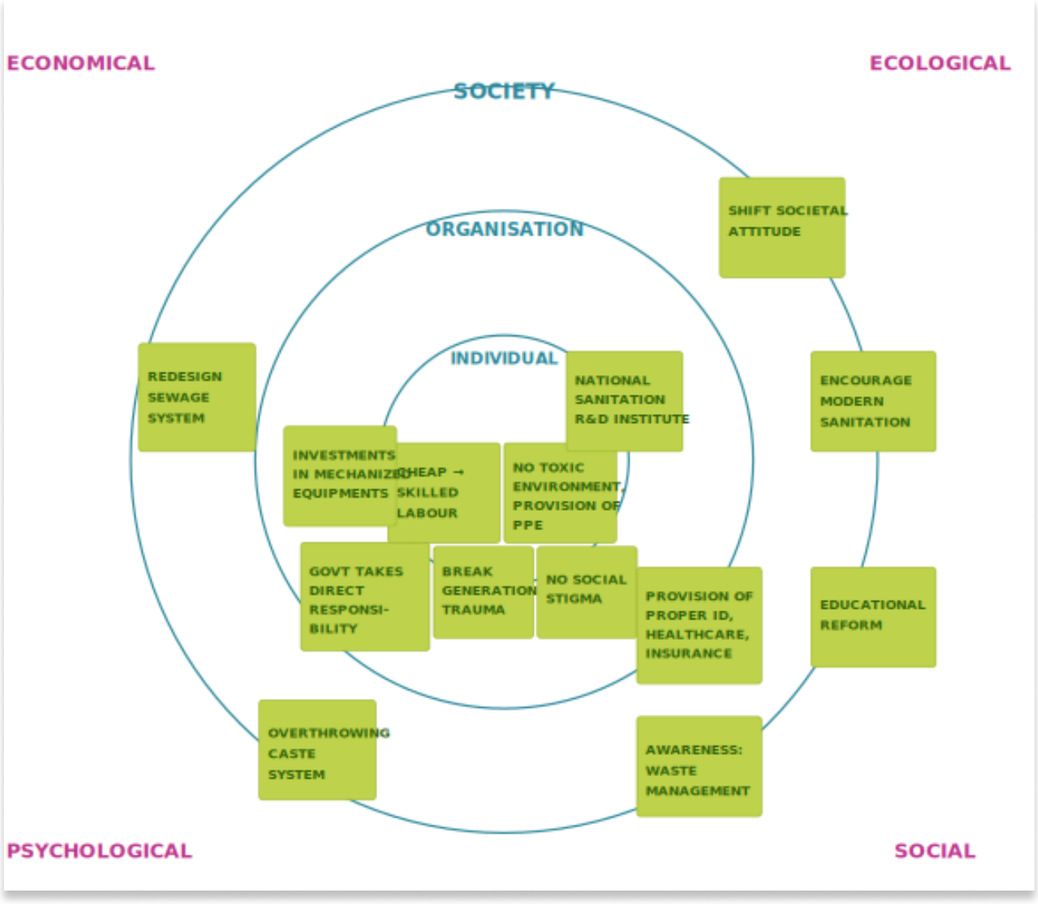
Step 2: Iceberg modeling



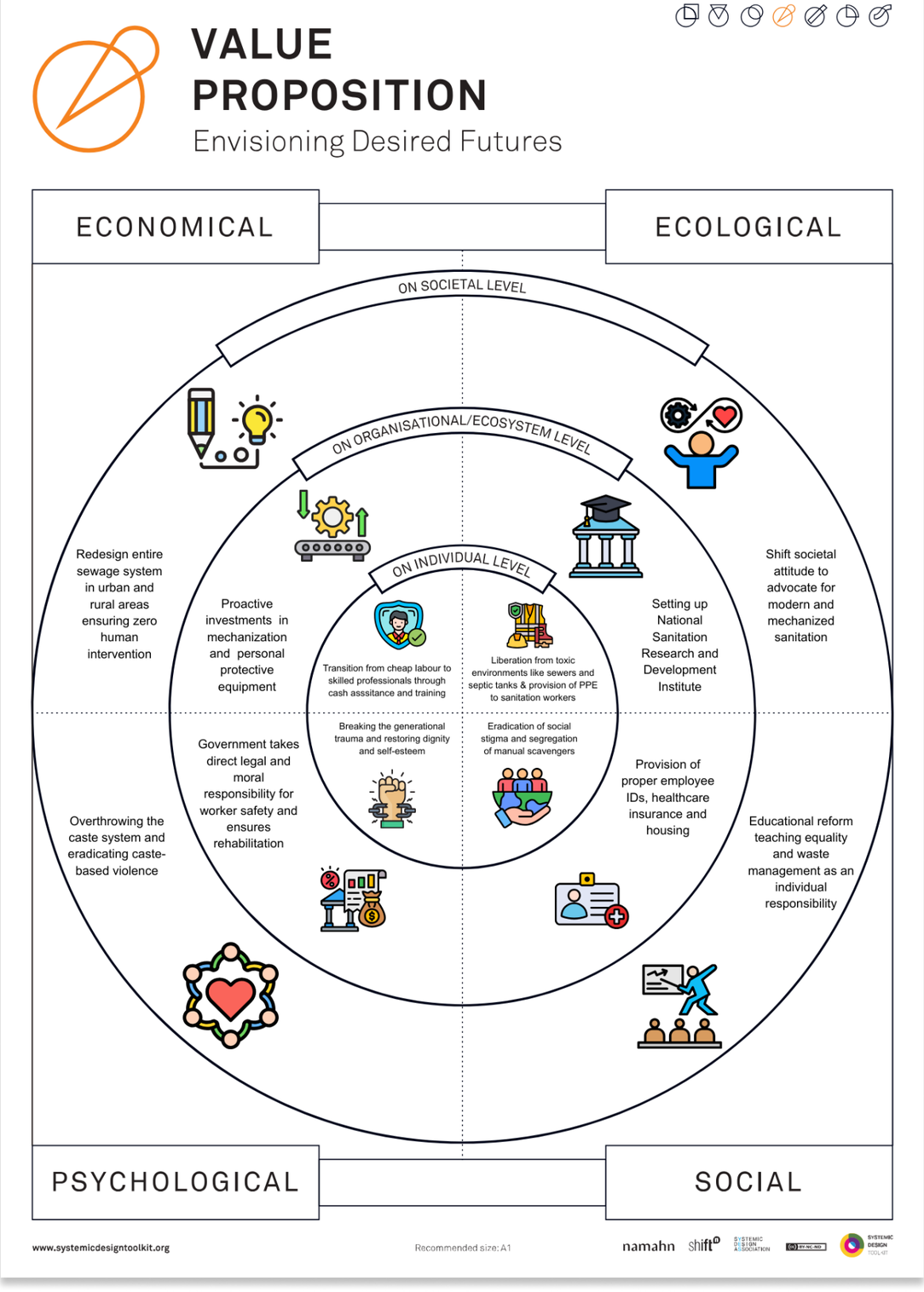


Step 3: Multicapital systems map





Step 4: Value proposition map



Appendix B : Interview guide

Interview guide (Iceberg Model framework)

The full interview transcripts are deliberately not reproduced here. Given the sensitivity of the material and the niche nature of the participants' activism, reproducing the transcripts would create a real risk of re-identification. Only the question framework and an anonymised account of the process are included.The questions were structured across the four levels of the Iceberg Model, moving from visible events down to the beliefs that anchor the system in place. The prompts below are the guiding questions; phrasing was adapted to each participant and translated where needed.

Opening (background and rapport)
- Could you introduce yourself and describe your work in this field?
- How did your involvement with manual scavenging begin?

Level 1 – The Litany (events and trends)
- How are sewer and septic tank deaths currently reported, and by whom?
- When a death is confirmed, what do you see on the ground, from the funeral and the family to the handling of the body and compensation?
- How do the official death counts compare with what you document in the field, and how do you gather your own data?
- How does mainstream media describe these deaths, and why do you think those terms are used?
- How do workers protect themselves on the ground when no safety equipment is provided?

Level 2 – Structures and systems (underlying causes)
- How are workers hired, and who is the actual employer behind the contractor?
- What is the role of the police, contractors, and supervisors after a death is confirmed?
- What happens to compensation, the filing of an FIR, and prosecution after a death?
- How do you assess government sanitation and rehabilitation schemes in practice?
- Why has mechanisation or technological alternatives failed to take hold, and what is the state of research and engineering in this area?
- What is the role of NGOs and civil society between the law and the public?
- What is the role of political parties and policymakers?
- What would effective rehabilitation actually look like?

Level 3 – Worldviews and values (paradigms)
- Why does this work remain assigned to specific communities rather than being open to all?
- Could education reform shift empathy and responsibility for waste, and how?
- How are sanitation work and the people who do it viewed by the wider public and by educated society?

Level 4 – Deep myths (metaphors)
- What underlying beliefs about waste and the people who handle it keep the system in place?
- What do you make of the belief that manual scavenging no longer exists and that everything is now mechanised?
- How do you understand the relationship between caste and the way this work is seen and inherited?

Closing (toward intervention)
- If an intervention were to be designed, where should it begin: a legal, engineering, or social point?
- Are there others working in the field you would recommend speaking with?

Appendix C : HREC Approval

Date 10-Apr-2026
Correspondence hrec@tudelft.nl

TU Delft Delft University of Technology

Human Research Ethics Committee TU Delft
(http://hrec.tudelft.nl)

Visiting address
Jaffalaan 5 (building 31)
2628 BX Delft

Postal address
P.O. Box 5015 2600 GA Delft
The Netherlands

Ethics Approval Application: Designing a Systemic Intervention for sustainable eradication of Manual Scavenging
Applicant: Srinivasan Bavani, Mounika

Dear Mounika Srinivasan Bavani,

It is a pleasure to inform you that your application mentioned above has been approved.

Thanks for your resubmission to the HREC, which has now been approved.

Good luck with your research!

Sincerely,

Dr. C. Shelley-Egan
Chair HREC
Faculty of Technology, Policy and Management

Appendix D: Informed consent forms

Delft University of Technology
HUMAN RESEARCH ETHICS
Informed Consent Form

A. Participant Information for NGO Volunteers/ Journalists/ Activists:

You are being invited to participate in a research study titled 'Designing a Systemic Intervention for Sustainable Eradication of Manual Scavenging'. This study is being done by Mounika from the TU Delft.

The purpose of this session is to discuss your professional experience working with manual scavenging activities. We will conduct an online interview via Teams/Google Meet which will be audio-recorded for transcription. All visual data (Including publicly available photographs) used in the research will undergo de-identification (facial blurring and metadata scrubbing) before being included in any systemic maps or the final thesis to protect the identity of the subjects and yourself. The data will be used for understanding the ground reality and the feasibility of the proposed intervention. We will be asking you to answer some questions about your experience in dealing with policy makers and victims of Manual scavenging. The interview will be conducted in Tamil or English and subsequently transcribed and translated into English for the purpose of this research study. To ensure accuracy and maintain your anonymity, the translation process will only use pseudonymized text where your identity has already been removed.

To the best of my ability, your answers in this study will remain confidential. We will minimize any risks by collecting data through secure, TU Delft-approved platforms that ensure GDPR-compliant processing. While we will collect professional views and basic professional metadata (PIRD), no IP addresses or unnecessary background data will be stored. Your data will be pseudonymized during the transcription phase in April 2026; this means your name and specific organization will be replaced with a generic code (e.g., "Expert A - Journalist") to protect your identity in a small field of specialists. All raw files will be stored on encrypted TU Delft OneDrive servers and will be accessible only to the researcher and the supervisors.

Regarding Open Data, only fully anonymized findings and high-level systemic findings will be published in the final Master's thesis or TU Delft repository. Raw, identifiable research data (PIRD) and your signed consent forms (PII) will be stored in a restricted-access private archive and will not be made available for open re-use by third parties.

Your participation in this study is entirely voluntary and you can refuse to answer questions. You can withdraw at any time. You may request the removal of your data until the point of de-identification in May 2026; after this date, data that has been fully anonymized and integrated into the systemic analysis cannot be retrieved.

B. Potential Risks of Participating:

A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION
1. I have read and understood the study information provided, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason
3. I understand that taking part in the study involves: • Participating in a semi-structured, audio-recorded interview conducted either face-to-face or via a secure digital platform (e.g., Zoom or Microsoft Teams). • Discussing my chronological, day-to-day experiences of investigating or responding to manual scavenging incidents, including the people, objects, environments, messages, and services involved. • The interview will be transcribed and translated into English for analysis and that only the translated, de-identified text will be used in research outputs. • Once the transcription is completed and verified (scheduled for April 2026), the original audio recording will be destroyed to minimize the storage of Personally Identifiable Research Data (PIRD)
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)
4. I understand that taking part in the study involves the following risks: • Discussing systemic failures in the enforcement of the manual scavenging ban may cause professional discomfort or potential friction with municipal authorities or contractors • Reflecting on the hazardous nature of this labor and the history of the caste system may be emotionally sensitive for those working closely with the victims I understand that these will be mitigated by • Focusing the interview on systemic drivers rather than individual criminal prosecution, and I have the absolute right to skip any question or stop the interview at any point
5. I understand that taking part in the study involves collecting specific personally identifiable information (PII) (e.g., name, email) and associated personally identifiable research data (PIRD) (e.g., professional role, expert views). Because I belong to a small, specialist community, there is a high possibility of re-identification which could potentially impact my public or professional reputation given the legal and social sensitivity of manual scavenging in India
6. I understand that sensitive data concerning illegal hazardous labor, violation of the 2013 Prohibition Act, and my professional/political views on the caste system and municipal accountability will be gathered
7. I understand that to minimize the threat of a data breach: My name and specific organization will be replaced by a generic code (e.g., "Expert 1 - Journalist") during the transcription phase. All data will be hosted on GDPR-compliant TU Delft OneDrive servers, ensuring secure storage.
8. I understand that the personal data I provide (raw audio and identifiers) will be destroyed immediately after the transcription phase (April 2026), and administrative PII will be deleted upon the awarding of the degree in June 2026
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION
9. I understand that after the research study: • The de-identified information I provide will be used to create visual graphics such as System maps, stakeholder maps etc., to identify leverage points for sustainable policy changes, and will be published in a Master's thesis • I agree that my responses, views, or other input can be quoted anonymously in research outputs • I have the right to request a review of the English translation of my quotes before they are published to ensure my views are represented accurately
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE
10. I grant permission to make de-identified anonymized transcripts and visual graphics that I provide to be archived in the TU Delft Research Data Repository for future research and learning and understand that access to this repository is restricted only to authorized researchers and students within the TU Delft network to prevent unauthorized re-identification

English version

டெல்:ப்ட் தொழில்நுட்ப பல்கலைக்கழகம்
மனித ஆராய்ச்சி நெறிமுறைகள்
தகவலறிந்த ஒப்புதல் படிவம்

A. தன்னார்வ தொண்டு நிறுவன **(NGO)** தன்னார்வலர்கள்/ பத்திரிகையாளர்கள்/
ஆர்வலர்களுக்கான பங்கேற்பாளர் தகவல்:

'கையேடு துப்புரவு முறையை (Manual Scavenging) நிலையான முறையில் ஒழிப்பதற்கான ஒரு அமைப்பு ரீதியான தலையீட்டை வடிவமைத்தல்' என்ற தலைப்பிலான ஆராய்ச்சி ஆய்வில் பங்கேற்க நீங்கள் அழைக்கப்படுகிறீர்கள். இந்த ஆய்வை டெல்:ப்ட் தொழில்நுட்ப பல்கலைக்கழகத்தைச் (TU Delft) சேர்ந்த மௌனிகா மேற்கொள்கிறார்.

இந்த அமர்வின் நோக்கம், கையேடு துப்புரவு தொடர்பான பணிகளில் உங்கள் தொழில்முறை அனுபவத்தைப் பற்றி விவாதிப்பதாகும். நாங்கள் Teams அல்லது Google Meet வழியாக ஒரு ஆன்லைன் நேர்காணலை நடத்துவோம், அது தட்டச்சுப் பணிக்காக ஆடியோ பதிவு செய்யப்படும். இந்த ஆராய்ச்சியில் பயன்படுத்தப்படும் அனைத்து காட்சித் தரவுகளும் (பொதுவெளியில் கிடைக்கும் புகைப்படங்கள் உட்பட), உங்கள் அடையாளத்தையும் சம்பந்தப்பட்டவர்களின் அடையாளத்தையும் பாதுகாப்பதற்காக, முகங்கள் மறைக்கப்பட்டும் (facial blurring) மற்றும் மெட்டாடேட்டாக்கள் நீக்கப்பட்டும் (metadata scrubbing) பயன்படுத்தப்படும். இந்தத் தரவுகள் தற்போதைய கள நிலவரத்தைப் புரிந்துகொள்ளவும், முன்மொழியப்பட்ட மாற்றங்களின் சாத்தியக்கூறுகளை ஆராயவும் பயன்படுத்தப்படும். கொள்கை வகுப்பாளர்கள் மற்றும் கையேடு துப்புரவு முறையினால் பாதிக்கப்பட்டவர்களுடன் உங்களுக்கு உள்ள அனுபவங்கள் குறித்து சில கேள்விகளை நாங்கள் கேட்போம். நேர்காணல் தமிழ் அல்லது ஆங்கிலத்தில் நடத்தப்படும், பின்னர் இந்த ஆய்விற்காக ஆங்கிலத்தில் மொழிபெயர்க்கப்படும். உங்கள் ரகசியத்தன்மையைப் பாதுகாக்கவும் துல்லியத்தை உறுதிப்படுத்தவும், உங்கள் அடையாளம் நீக்கப்பட்ட பின்னரே மொழிபெயர்ப்பு செயல்முறை மேற்கொள்ளப்படும்.

இந்த ஆய்வில் உங்கள் பதில்கள் ரகசியமாக வைக்கப்படும். GDPR விதிமுறைகளுக்கு இணங்க, பாதுகாப்பான தளங்கள் மூலம் மட்டுமே தரவுகள் சேகரிக்கப்படும். உங்கள் தொழில்முறை கருத்துக்கள் மற்றும் அடிப்படை விவரங்கள் (PIRD) சேகரிக்கப்பட்டாலும், IP முகவரிகள் அல்லது தேவையற்ற தரவுகள் சேமிக்கப்படாது. ஏப்ரல் 2026-ல் உங்கள் தரவுகளுக்குப் புனைப்பெயர்கள் (pseudonymized) தூட்டப்படும்; அதாவது உங்கள் பெயர் மற்றும் நிறுவனத்திற்குப் பதிலாக ஒரு பொதுவான குறியீடு (எ.கா. "நிபுணர் A - பத்திரிகையாளர்") பயன்படுத்தப்படும். அனைத்து அசல் கோப்புகளும் குறியாக்கம் செய்யப்பட்ட TU டெல்:ப்ட் ஒன்டிரைவ் (OneDrive) சேமிப்பகத்தில் இருக்கும்.

திறந்த தரவு (Open Data) கொள்கையைப் பொறுத்தவரை, முற்றிலும் அடையாளம் நீக்கப்பட்ட முடிவுகள் மட்டுமே முதலலை ஆய்வேட்டில் வெளியிடப்படும். உங்கள் கையொப்பமிட்ட ஒப்புதல் படிவங்கள் மற்றும் அசல் தரவுகள் பாதுகாக்கப்பட்ட தனிப்பட்ட காப்பகத்தில் வைக்கப்படும், மேலும் அவை மூன்றாம் தரப்பினரால் பயன்படுத்த அனுமதிக்கப்படாது.

இந்த ஆய்வில் உங்கள் பங்கேற்பு முற்றிலும் தன்னார்வமானது. நீங்கள் எந்தக் கேள்விக்கும் பதிலளிக்க மறுக்கலாம் மற்றும் எந்த நேரத்திலும் ஆய்விலிருந்து விலகலாம். மே 2026-ல் தரவுகள் அடையாளம் நீக்கப்படுவதற்கு முன்பு வரை, உங்கள் தரவுகளை நீக்குமாறு நீங்கள் கோரலாம்.

B. பங்கேற்பதற்கான சாத்தியமான அபாயங்கள்:

A: பொதுவான உடன்பாடு – ஆய்வு இலக்குகள், பங்கேற்பாளர் பணிகள் மற்றும் தன்னார்வப் பங்கேற்பு
1. வழங்கப்பட்ட ஆய்வுத் தகவல்களை நான் படித்துப் புரிந்துகொண்டேன். ஆய்வைப் பற்றிக் கேள்விகள் கேட்க எனக்கு வாய்ப்பு அளிக்கப்பட்டது, எனது கேள்விகளுக்குத் திருப்திகரமான பதில்கள் கிடைத்துள்ளன
2. இந்த ஆய்வில் பங்கேற்க நான் தன்னிச்சையாகச் சம்மதிக்கிறேன். எந்தக் கேள்விக்கும் பதிலளிக்க மறுக்கவோ அல்லது எந்த நேரத்திலும் காரணம் கூறாமல் ஆய்விலிருந்து விலகவோ எனக்கு உரிமை உண்டு என்பதை நான் புரிந்துகொள்கிறேன்..
3. இந்த ஆய்வில் பங்கேற்பு என்பது பின்வருவனவற்றை உள்ளடக்கியது என்பதை நான் புரிந்துகொள்கிறேன்: • ஆடியோ பதிவு செய்யப்பட்ட நேர்காணலில் பங்கேற்பது. • கையேடு துப்புரவுச் சம்பவங்களை விசாரிப்பதில் அல்லது கையாளுவதில் எனது அன்றாட அனுபவங்கள் மற்றும் அதில் தொடர்புடைய நபர்கள், பொருள்கள், சூழல்கள் குறித்து விவாதிப்பது. • நேர்காணல் தட்டச்சு செய்யப்பட்டு ஆங்கிலத்தில் மொழிபெயர்க்கப்படும். அடையாளம் நீக்கப்பட்ட உரை மட்டுமே ஆய்வு வெளியீடுகளுக்குப் பயன்படுத்தப்படும். • தட்டச்சுப் பணி முடிந்ததும் (ஏப்ரல் 2026), அசல் ஆடியோ பதிவு அழிக்கப்படும்.
B:பங்கேற்பதற்கான சாத்தியமான அபாயங்கள் (தரவு பாதுகாப்பு உட்பட)
4. இந்த ஆய்வில் பங்கேற்பதில் பின்வரும் அபாயங்கள் இருப்பதை நான் புரிந்துகொள்கிறேன்: • கையேடு துப்புரவுத் தடைச் சட்டத்தை அமல்படுத்துவதில் உள்ள தோல்விகள் பற்றி விவாதிப்பது. நகராட்சி அதிகாரிகள் அல்லது ஒப்பந்ததாரர்களுடன் தொழில்முறை ரீதியான உரையாடல் ஏற்படுத்தக்கூடும். • சாதி அமைப்பின் வரலாறு மற்றும் இந்த அபாயகரமான வேலையின் தன்மை குறித்து சிந்திப்பது உணர்ச்சிரீதியான பாதிப்பை ஏற்படுத்தலாம். • தனிப்பட்ட குற்றவியல் நடவடிக்கைகளை விட, அமைப்பு ரீதியான காரணிகளில் நேர்காணல் கவனம் செலுத்தும் என்பதன் மூலமும், எந்தக் கேள்வியையும் தவிர்க்க எனக்குள்ள உரிமை மூலமும் இந்த அபாயங்கள் குறைக்கப்படும் என்பதை நான் புரிந்துகொள்கிறேன்.
5. எனது பெயர், மின்னஞ்சல் மற்றும் தொழில்முறை கருத்துக்கள் சேகரிக்கப்படும் என்பதை நான் புரிந்துகொள்கிறேன். நான் ஒரு சிறிய, நிபுணத்துவ சமூகத்தைச் சேர்ந்தவர் என்பதால், எனது அடையாளம் மீண்டும் கண்டறியப்பட வாய்ப்புள்ளது.
6. சட்டவிரோதமான அபாயகரமான உழைப்பு, 2013-ஆம் ஆண்டு தடைச் சட்ட மீறல் மற்றும் சாதி அமைப்பு குறித்த எனது கருத்துக்கள் போன்ற உணர்திறன் வாய்ந்த தரவுகள் சேகரிக்கப்படும் என்பதை நான் புரிந்துகொள்கிறேன்.
7. தரவு கசிவு அச்சுறுத்தலைக் குறைக்க: தட்டச்சு செய்யும் போது எனது பெயர் மற்றும் நிறுவனத்திற்குப் பதிலாக ஒரு பொதுவான குறியீடு பயன்படுத்தப்படும். அனைத்துத் தரவுகளும் பாதுகாப்பான TU டெல்:ப்ட் ஒன்டிரைவ் சர்வர்களில் சேமிக்கப்படும்.
8. எனது தனிப்பட்ட தரவுகள் ஏப்ரல் 2026-ல் அழிக்கப்படும், மேலும் நிர்வாக விவரங்கள் ஜூன் 2026-ல் பட்டம் வழங்கப்பட்டவுடன் நீக்கப்படும்.

C: ஆய்வு வெளியீடு மற்றும் பயன்பாடு
9. ஆய்வு முடிவுக்குப் பின்: • நான் வழங்கிய தகவல்கள் அமைப்பு வரைபடங்கள் (System maps, stakeholder maps) உருவாக்கப் பயன்படுத்தப்படும் மற்றும் முதுகலை ஆய்வேட்டில் வெளியிடப்படும். • எனது கருத்துக்கள் பெயர் குறிப்பிடாமல் (anonymously) ஆய்வில் பயன்படுத்தப்பட நான் ஒப்புக்கொள்கிறேன். • எனது மேற்கோள்களின் ஆங்கில மொழிபெயர்ப்பை வெளியிடுவதற்கு முன் மதிப்பாய்வு செய்ய எனக்கு உரிமை உண்டு.
D: நீண்ட கால) தரவு சேமிப்பு மற்றும் மறுபயன்பாடு
10. அடையாளம் நீக்கப்பட்ட உரைகள் மற்றும் வரைபடங்களை எதிர்கால ஆராய்ச்சி மற்றும் கற்றலுக்காக TU டெல்:ப்ட் ஆராய்ச்சி தரவு களஞ்சியத்தில் சேமிக்க நான் அனுமதி அளிக்கிறேன். இந்தத் தரவுகளை அங்கீகரிக்கப்பட்ட ஆராய்ச்சியாளர்கள் மட்டுமே அணுக முடியும் என்பதை நான் புரிந்துகொள்கிறேன்.

இந்த ஒப்புதல் படிவத்தில் கையொப்பமிடுவதன் மூலம், மேலே குறிப்பிட்டுள்ள பந்தனைகளைப் படித்து ஒப்புக்கொள்கிறேன் என்பதை உறுதிப்படுத்துகிறேன்.

கையெழுத்து தேதி

ஆராய்ச்சியாளர் ஆகிய நான், பங்கேற்பாளருக்குத் தகவல் தாளினைத் துல்லியமாக வாசித்துக் காட்டினேன், மேலும் பங்கேற்பாளர் எதற்கெல்லாம் சம்மதிக்கிறார் என்பதை முழுமையாகப் புரிந்துகொண்டுள்ளார் என்பதை உறுதிப்படுத்துகிறேன்.

07-04-2026

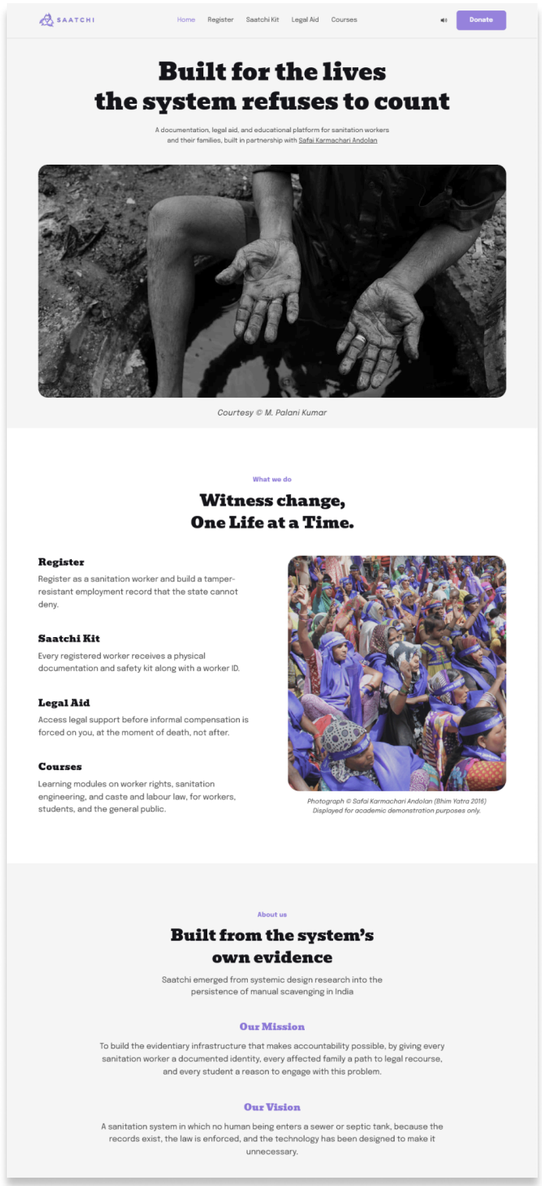
மௌனிகா சீனிவாசன் பவானி கையெழுத்து தேதி

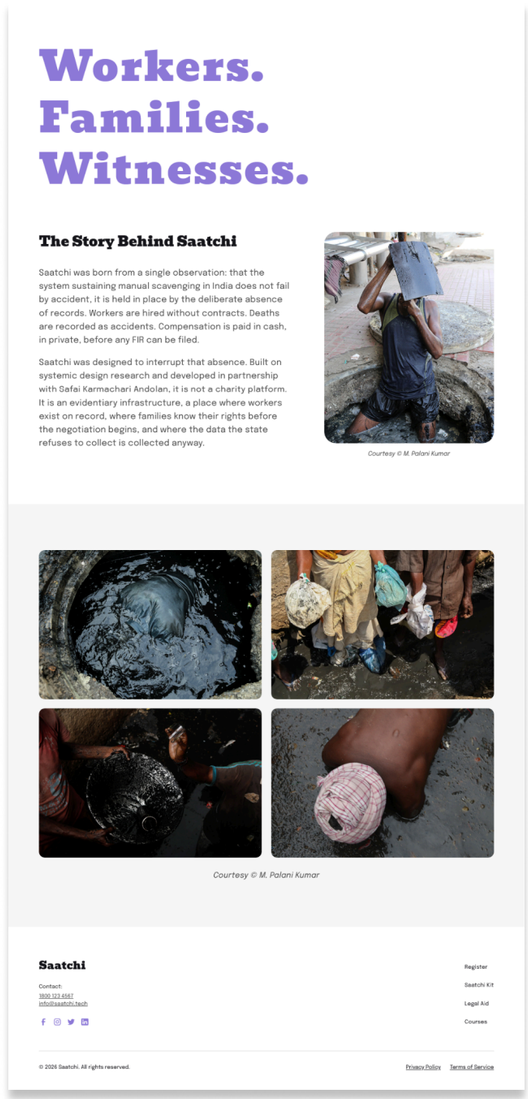
மேலதிகத் தகவல்களுக்குத் தொடர்புகொள்ள வேண்டிய விவரங்கள்: மௌனிகா,
msrinivasanbav@tudelft.nl

Tamil version

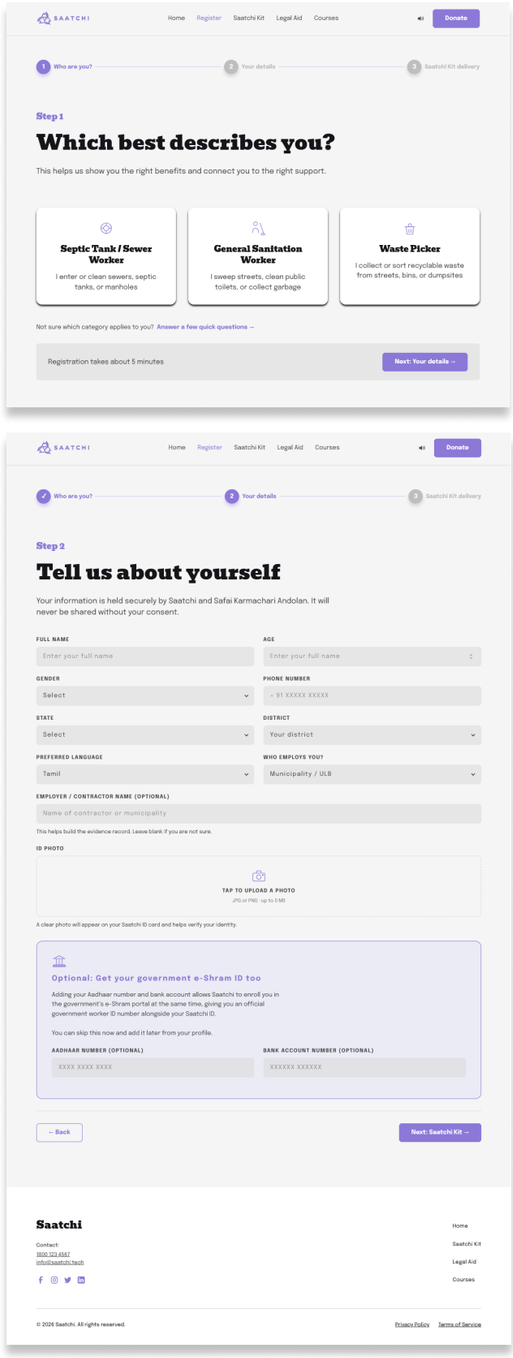
Appendix E : Saatchi prototype

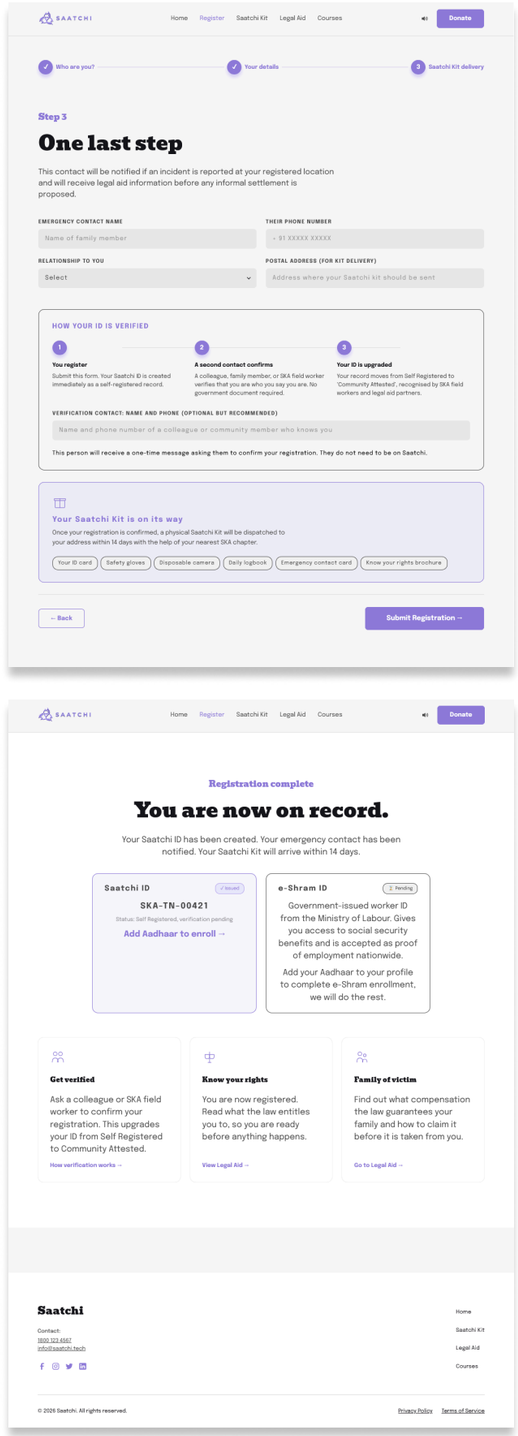
Homepage of Saatchi





Registration section





Saatchi Kit section

SAATCHI Home Register Saatchi Kit Legal Aid Courses Donate

Saatchi Kit

Everything you need to protect yourself on record

A physical kit issued to every registered worker. It contains the tools to document your work, assert your rights, and stay safe.

Register to claim your kit →



Saatchi ID Card

Your official identity as a registered sanitation worker. Carries your Saatchi ID, worker type, and emergency contact.

Safety Gloves

Heavy-duty gloves certified for sanitation work. Required equipment under the MS Act 2013.

Disposable Camera

To document hazardous conditions, injuries, or violations. Photos are deposited at Saatchi and added to your file.

Daily Logbook

A structured diary to record daily work: location, task type, hours, equipment provided, hazards encountered.

Emergency Contact Card

A laminated card listing five legal help contacts victims can reach during an emergency situation. Kept in your pocket always.

Know Your Rights Brochure

A pocket summary of your legal entitlements under the MS Act 2013 and your right to refuse unsafe work.

How to get it

Three steps to your kit

01
Register on Saatchi

Complete your registration online or through a community partner. Takes under 10 minutes.

Start registration →

02
Community verification

A local community partner or NGO verifies your work. This protects the integrity of every Saatchi ID.

03
Kit arrives in 14 days

Your kit is dispatched to your registered address within 14 working days of verification.

THE DISPOSABLE CAMERA

Your camera is evidence. Every photograph you take becomes part of your official file, four steps from hazard to legal record.

01 **Photograph**
Document unsafe conditions, missing equipment, or injuries on site.

02 **Deposit**
Hand the camera in at your nearest Saatchi point or mail it using the prepaid envelope.

03 **Added to file**
Photos are developed, digitised, and attached to your Saatchi record with metadata.

04 **Used for legal aid**
Your photographs become admissible evidence if you pursue a legal case.

Who is eligible

The kit is for every sanitation worker

If you work in any of the three categories below, you are entitled to a Saatchi Kit at no cost.

Septic / Sewer Worker

Workers who manually clean septic tanks, sewers, or drainage systems.

General Sanitation Worker

Municipal sweepers, drain cleaners, and public toilet maintenance staff.

Waste Picker

Workers who collect, sort, or segregate solid waste at dumpsites or collection points.

The kit is issued once. If your ID card is lost or damaged, a replacement can be requested through your Saatchi profile at no cost.

Your kit is waiting

Register in under 10 minutes. The kit ships to you free of charge.

Register to claim your kit →

Saatchi

Contact:
1800 123 4567
info@saatchi.tech

Register
Saatchi Kit
Legal Aid
Courses

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Legal Aid section

SAATCHI Home Register Saatchi Kit Legal Aid Courses Donate

Know your rights

The law is by your side

The MS Act 2013 and Supreme Court rulings guarantee specific rights to every sanitation worker and their family. Most people never claim them because no one tells them they exist.

I am a sanitation worker

Find out what benefits and protections you are legally entitled to under the MS Act 2013.

View my rights →

A family member has died

Find out what compensation the law guarantees your family and how to claim it before it is taken from you.

View compensation rights →

I am an employer

Find out what the law requires of you and the penalties for non-compliance or death on site.

View employer obligations →

For sanitation workers

What the government owes you

These are not requests or promises. They are legal entitlements under the MS Act 2013 and SRMS scheme. If you have been identified as a manual scavenger, you are owed all of the following.

₹40,000 Cash Assistance

One-time payment to every identified manual scavenger. One per family. No repayment required.

Free Skill Training

Training in a trade of your choice, free of cost, with ₹3,000/month paid to your bank account while you train.

Business Loan

Up to ₹15 lakhs to start your own business. Half the cost is a government subsidy you never have to repay.

Health Insurance

You and your family are covered under Ayushman Bharat PM-JAY for 5 years from identification.

Education Loan for children

Your children can access an education loan of up to **₹10 lakhs** for study in India and **₹20 lakhs** for study abroad, at just **6% interest**.

Check eligibility →

For families

If someone you love died in a sewer

You are entitled to ₹30 lakhs. The Supreme Court said so in 2014. You are not required to accept less, no matter what a contractor or police officer tells you.

01
Do not sign anything

Employers or contractors may ask you to sign documents – releases, settlements, NDAs – in exchange for money. Do not sign. Anything you sign may waive your right to compensation. Wait for legal support first.

02
Document what you know

Write down or voice-record everything you know: the employer's name, the location, who was present, what tools were or weren't provided, and what you were told.

03
Get legal support now

Saatchi connects you to legal aid partners who will represent you before the negotiation begins, not after it is already over.

Get Legal Aid now →

For employers and contractors

What the law requires & what it punishes

The MS Act 2013 places legal responsibility directly on employers. Subcontracting does not remove your liability.

Your obligations

- Provide all 44 mandated protective equipment items to every worker deployed near a sewer or septic tank
- Maintain formal employment records and issue identity documentation to every worker
- Use mechanised cleaning alternatives
- Report every sewer entry and any incidents to the relevant municipal authority
- Informal cash settlements paid to families do not discharge your legal liability

Penalties for non-compliance

First offence
Up to **1 year imprisonment** and a fine of **₹50,000**

Repeat Offence
Up to **2 years imprisonment** and a fine of **₹1,00,000**

If the worker suffered a permanent disability
A minimum of **₹20,00,000** compensation

If a worker dies
Up to **5 years imprisonment** and mandatory **₹30,00,000** compensation to the family

Reclassifying a sewer death as an "accident" to avoid prosecution is itself a criminal offence under the Act.

Don't face this alone

Saatchi connects you to legal aid lawyers at no cost. Register first – your file is your case.

Get Legal Aid now →

Saatchi

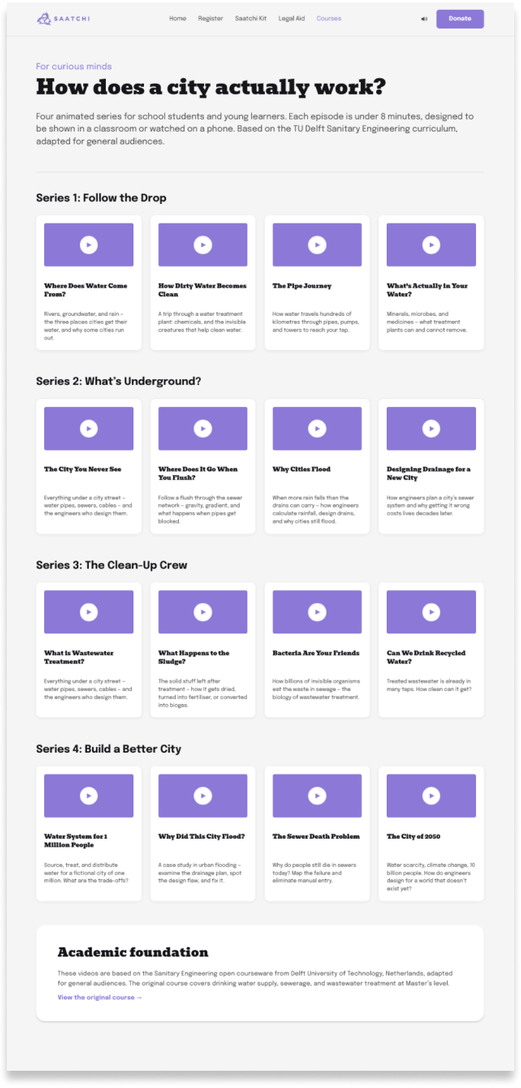
Contact:
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info@saatchi.tech

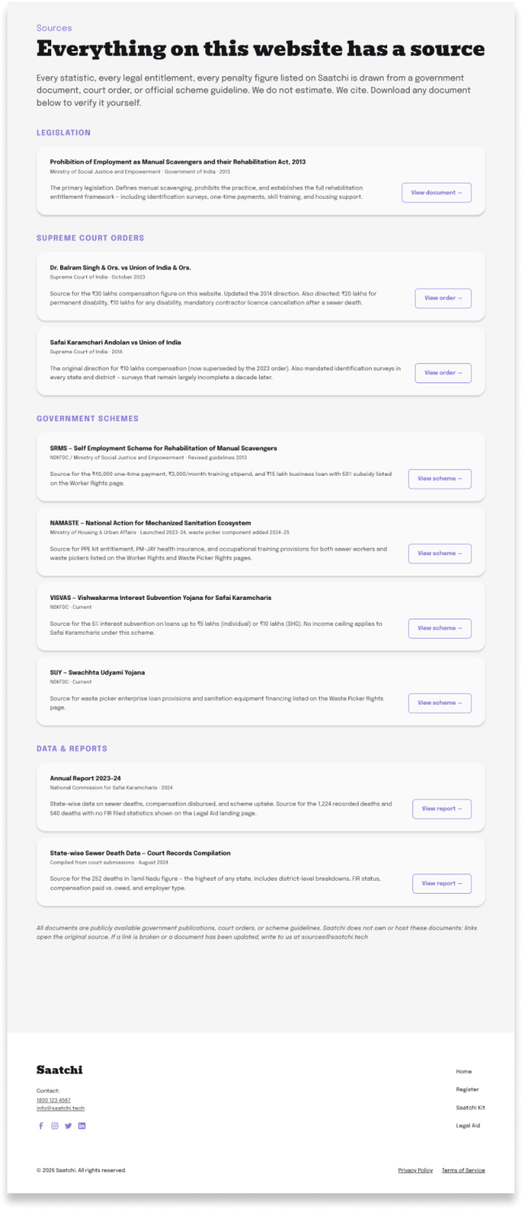
Register
Saatchi Kit
Legal Aid
Courses

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Courses section





Design guide

