



The Sanitation & Hygiene Fund

Sanitation Economy Estimates

KENYA 2022

This report has been developed for the Ministry
of Water, Sanitation and Irrigation, Kenya.

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FOR MORE INFORMATION

SHF Website www.shfund.org

About This Report

Safe sanitation, hygiene and menstrual health are essential to the achievement of health, education, gender equity, economic growth and climate outcomes in Kenya. This report shines a spotlight on why making investments now into a thriving national sanitation economy makes sense for women, entrepreneurs, investors, the environment, climate, social impact and economic growth. These markets focus on products and services, renewable resource flows, and data and information to transform cities, communities and businesses in pursuit of national targets for equitable and sustainable development. In the context of the political, economic, social and technological landscape and the business environment, this report provides insights into the multiple opportunities for existing partners and new investors.

A Note on the Estimates

The report builds on earlier estimates, commissioned in 2020. The new estimates reflect a significant evolution and are increasingly anchored in country planning and budgets, and localized pricing. Where, in the past, a thriving sanitation economy was assumed in the baseline year, the updated estimates start with an estimate of the current reality. The baseline estimates are projected into the future, with the assumption of reaching universal access, to generate a realistic picture of the full market potential and opportunity. Across the report, updated data, research and assumptions were used. Data collection and analysis was carried out between August and December 2022, followed by a review, including a consultation workshop with government and other key experts in early 2023. All calculations use the conversion rate of US\$ 1 equals Kenyan shilling (KES) 123.42 as per the exchange rate on 9 September 2022.

About the Sanitation and Hygiene Fund

The Sanitation and Hygiene Fund (SHF) is a UN fund dedicated to achieving universal access to sanitation, hygiene, and menstrual health through market-based approaches. SHF works with Low-and Middle-Income Countries (LMICs) to build robust and climate-resilient sanitation economies and MHH markets. In Kenya, SHF is supporting the government to enhance market ecosystems and identify investible propositions with a view to channeling investments in conjunction with development finance institutions and investors.

For more information, please visit:
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Introduction

“ There is a growing recognition that a transformative approach is needed to meet global and national targets on sanitation, hygiene and menstrual health, and any such approach must be grounded in evidence and data. By catalyzing and growing national sanitation economies, we can unlock tangible impacts on health, education, gender equality, livelihoods and climate resilience for governments and for investors. ”

Dominic O’Neill, Executive Director of the Sanitation and Hygiene Fund

Only seven years to 2030 and not only is progress on many Sustainable Development Goals (SDGs) lagging, but hopes of attaining the multiple benefits of women’s social and economic empowerment are under threat. In fact, the sanitation and hygiene target, SDG 6.2 related to safe sanitation, will not be reached until the 22nd century under current conditions.¹ The business of development is not working at the pace and scale needed.

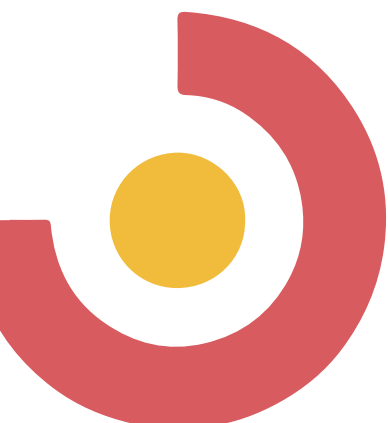
Kenya’s development priorities focus on sustainable and equitable economic growth, socio-economic development for a just and cohesive society in a clean and secure environment, and a political landscape that is issue-based, people-centered, results-oriented, accountable and democratic.² To realize Kenya’s development ambition, there is an urgent need to ensure the role of women as leaders, entrepreneurs, employees and consumers in society and the economy. This cannot happen without affordable access to menstrual health and hygiene (MHH) products and services, and a strong sanitation economy that benefits all.

Achieving universal access to sanitation is a huge challenge. Access to safe sanitation is a basic human right. However, nearly half of the global population still does not have access to safely-managed sanitation, meaning they have a dirty or unsafe toilet where the waste is not treated, or there is no toilet at all.³ Urgent acceleration of the current rate of progress, with increased investments in the sanitation and hygiene sector, is required if national development priorities and the global 2030 SDGs are to be met.

The world requires an urgent shift on how we tackle sanitation, a challenge that underpins several other SDGs linked to climate, livelihoods, economic growth, gender, global health and education. This report shows that the market economy approach can deliver on accelerating progress in the sanitation and hygiene sectors. The findings present an opportunity for stakeholders to accelerate collective progress towards achieving SDG 6.2.

A Note on Market Drivers and Barriers

The development of any new economy or market encounters drivers and barriers. The development of the sanitation economy in Kenya is no different. As the market is shaped through innovations along the value chain, strong and dynamic capabilities are needed. Kenya is committed to working with its partners to tackle the systemic barriers that prevent entrepreneurs and enterprises from taking action. This includes work on improving financial competitiveness, considering incentives in the supply chain, enhancing infrastructure and supporting the building of capability among small and medium-sized enterprises (SMEs), in addition to public acceptance of new approaches, products and costs.



About the Sanitation Economy

The **Sanitation Economy** is the growing economy of sanitation and hygiene products and services for all, including for the poorest and most vulnerable. It includes:

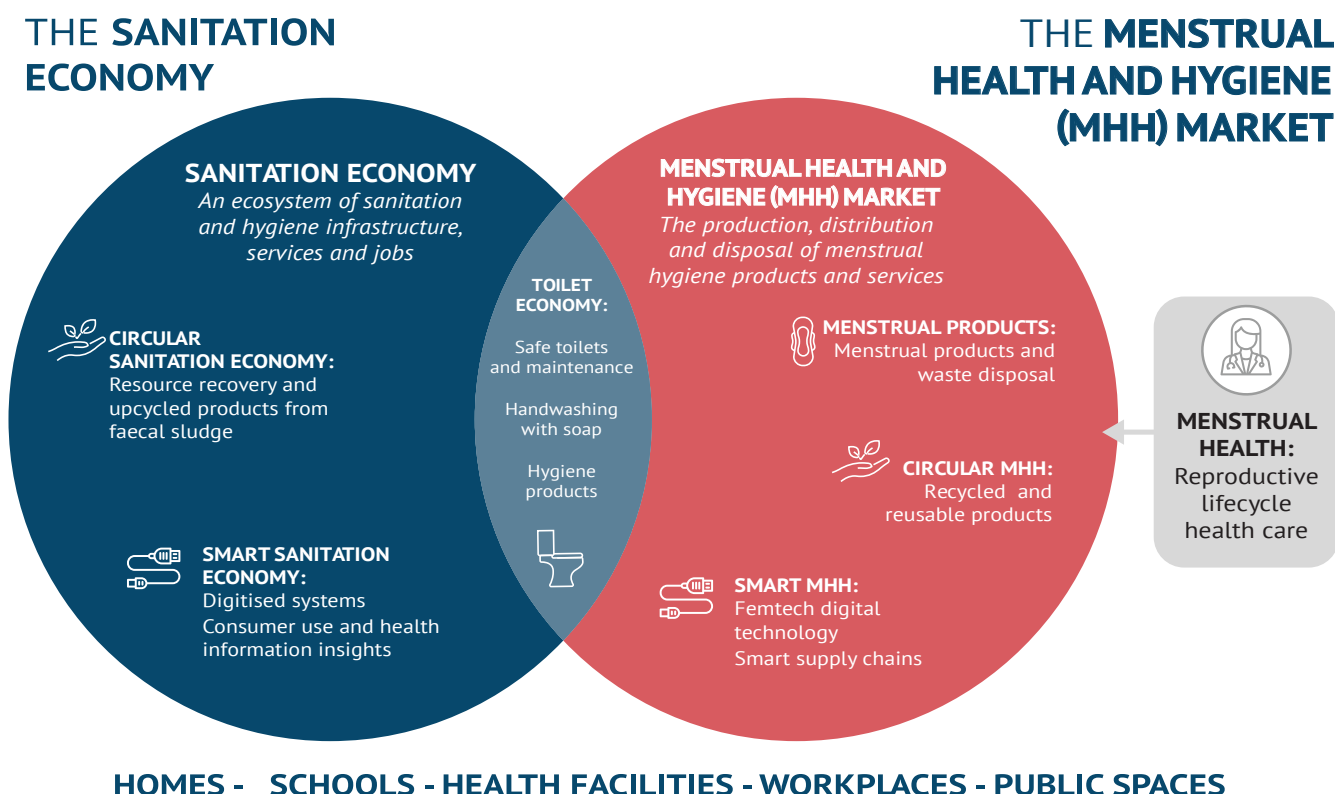
- products and services that provide safe toilet and handwashing access for all, whether public or private (Toilet Economy);
- systems that connect the biocycle, using multiple forms of biological waste, recovering nutrients and water, creating value-adding products such as renewable energy, organic fertilizers, proteins and more (Circular Sanitation Economy); and
- digitized sanitation and hygiene systems that optimize data for operating efficiencies, maintenance, plus consumer use and health information insights (Smart Sanitation Economy).⁴

The **Menstrual Health and Hygiene (MHH) Market** is the marketplace for menstrual hygiene materials, and development of related infrastructure, products and services including disposal and femtech solutions. It includes:

- access to reusable and disposable menstrual materials, as per choice and affordability, gender-responsive facilities and services allowing users to change, clean or dispose of materials safely (Menstrual Products);
- new and innovative technology including recycling and reuse to reduce the impact on the environment (Circular MHH); and
- smart supply chains to extend reach (Smart MHH).

These markets are closely connected as menstruating women and girls require access to safe toilets, handwashing and hygiene products, in addition to MHH.

Figure 1. The Sanitation Economy and Menstrual Health and Hygiene (MHH) Market



Methodology

This report estimates the size of the sanitation economy, its products and services, renewable resource flows, data and information at a country level. The estimates were generated from verified data from published government and other available sources, and cross-validated by interviews with sector experts (see Figure 2). Estimates are provided for a baseline year (2022) and projected into the future on the assumption that universal access will be reached.

Figure 2: Data Sources and Methodology

THE SANITATION ECONOMY POTENTIAL FRAMEWORK					
Objectives	Methods and Tools	Data			
Country-level Analysis	Desk Research: PEST Analysis	Economic (GDP, Employment)		Social (Population, Gender, Urbanization)	
Market Projection	Desk Research and Calculation: Sanitation Economy Estimates Model	Sanitation Economy (Toilet, Circular Sanitation and Smart Sanitation Economies)			
Market Insights	Interviews, Consultation, and Desk Research: SWOT Analysis	Current Market	Market Drivers	Market Barriers	Market Opportunities
Solutions Showcase	Interviews, Consultation Group, and Desk Research	Investible Sanitation			

PEST = Political, economic, social and technological | **SWOT** = Strengths, weaknesses, opportunities and threats

The country's potential was assessed at both macro and micro levels. Starting at the macro level, the economic, social and technological landscape was examined, using available reports, research and statistics. Each data source was assessed in terms of validity, integrity, precision, reliability and timeliness. Additional market insights were gathered through a series of interviews with key experts in the sanitation and hygiene spaces in the country. Interviewees included key government officials working on sanitation and hygiene, and private sector and civil society representatives. The interview data was triangulated with the secondary information sources.

The sanitation economy estimates were calculated based on the most recent population estimates and growth projections, available macroeconomic data and data on current access to sanitation and hygiene, existing estimates of the market value of products and services, and available data on the national context and consumer behaviors. Data collection and analysis was carried out between August to December 2022, followed by a review, including a consultation workshop with government and other key experts in early 2023. The received feedback and comments were integrated and estimates and narrative were subsequently finalized.

As with all research, the estimates presented in this report are subject to some assumptions and limitations. While care was taken to only use the best and most recent available data and to address data gaps, including through the involvement of experts, some gaps remain and not all expert opinions have been independently verified. The projections assume steady progress towards universal access; however, these emerging markets are subject to long-term political, social and economic trends and developments, and may experience unexpected shocks, which could impact the outcomes.

Country Context

Kenya remains off-track in delivering safely managed sanitation for all by 2030. According to the Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP), as of 2020, 8.5% of the Kenyan population still practiced open defecation, while only 32.7% had access to improved sanitation facilities.⁵ The situation is particularly dire in rural areas, where 40.6% of the population has unimproved sanitation facilities.⁶ To achieve national sanitation targets by 2030, investments in sanitation, including menstrual health, need to be prioritized. The country's strengths could attract investments:



Large and growing population: Kenya had an estimated population of 53 million people in 2021.⁷ With an average annual growth rate estimated at 2.360% between 2020 and 2030, the Kenyan population is estimated to reach 60.34 million in 2025 and 67.86 million in 2030.⁸ This presents a large potential market for sanitation products and services. Kenya also has a relatively young population, with a large proportion (75%) of its population under the age of 35, presenting potential workforce for the private sector.⁹ Kenya's growing population also risks putting pressure on the country's sanitation infrastructure, presenting the need for increased investment and action.



Rapid urbanization: in 2021, Kenya's urban population accounted for 28% of the population.¹⁰ The UN-Habitat has also projected that this figure could reach 44 million people (46% of the total population) by 2050.¹¹ The sanitation situation is particularly challenging in urban areas, where high population densities and inadequate infrastructure lead to poor sanitation conditions. This creates the need for innovative sanitation solutions that can be adapted to the urban context, such as low-cost and space-saving facilities.



Thriving economic environment: prior to the COVID-19 pandemic, Kenya experienced consistent economic growth with an average annual growth rate of 5.9% from 2010 to 2018.¹² From a huge dip in 2020, Kenya rebounded in 2021 with a 7.5% average annual growth rate which continued in 2022.¹³ This shows a favorable environment.



Evident government support for sanitation: the Kenyan government has prioritized the sanitation sector as part of its development agenda, with a focus on achieving universal access to basic sanitation facilities by 2030. It has developed various policies and programs to support the provision of sanitation services in the country including the National Hygiene and Sanitation Strategy (NHSS), Kenya Sanitation and Hygiene Improvement Program (KSHIP), and the Sanitation and Hygiene Policy Framework.¹⁴ The government's commitment to improving access to sanitation services through policies and programs can also create a favorable environment for growing the sanitation economy.



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Value of the Sanitation Economy

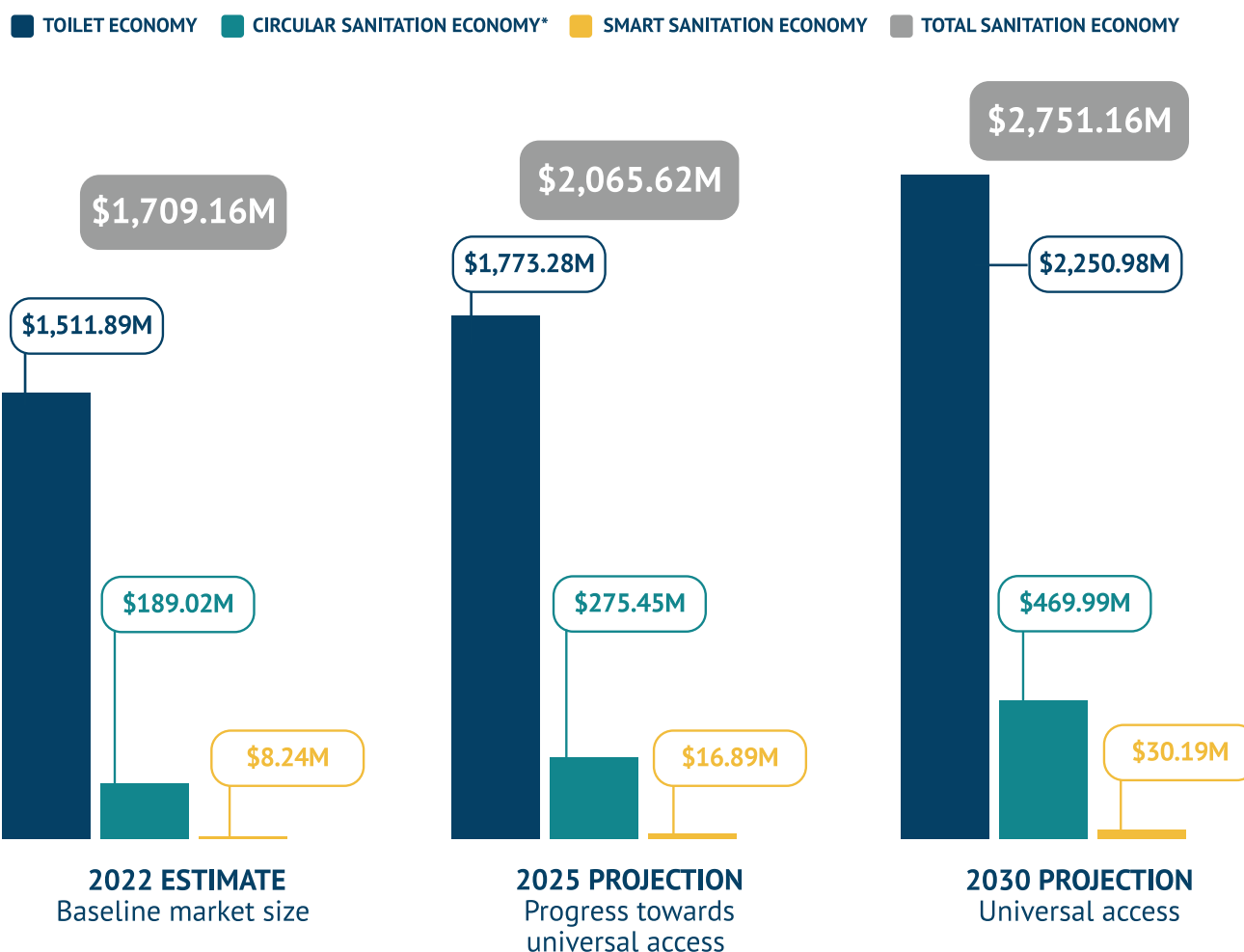
The current total value of the sanitation economy in Kenya is US\$ 1.7 billion. Potentially it can reach US\$ 2.8 billion, once universal access has been achieved.

KEY POINTS

- At present, the toilet economy accounts for close to 90% of the total sanitation economy.
- The circular sanitation economy and the smart sanitation economy are expected to grow.
- The potential for economic, environmental, and social return is significant.

When toilet, circular sanitation and smart sanitation economies are thriving, businesses can deliver new and alternative toilet and waste management solutions at a lower cost. They generate revenue and become net producers of valuable resources, such as water, energy, nutrients, proteins, data and information, presenting a new development pathway of opportunities for governments and the business sector to achieve SDG 6.

MARKET ESTIMATE FOR SANITATION ECONOMY (IN US\$ MILLION)



*While biogas has the highest financial potential, it breaks the nutrient cycle as the compounds from food consumption are burned rather than returned to the food system. For the overall sanitation economy estimate, and given that only one product can be produced from a volume of waste, Protein Meal product is selected as it promises financial returns while contributing back to the food system.

Toilet Economy

The **toilet economy** has the potential to grow from an estimated value of US\$ 1.5 billion in 2022 to US\$ 2.25 billion, once universal access has been achieved. Within this category, the household toilet market is valued at US\$ 1.2 billion in 2022 and has the potential to reach US\$ 1.9 billion, and the public toilet market is valued at US\$ 258.3 million in 2022 and may reach US\$ 362.4 million.

MARKET ESTIMATE FOR 2030 TOILET ECONOMY (IN US\$ MILLION) PROJECTION Universal Access



Table 1: Kenya Household Toilet Market

MARKET ESTIMATES FOR TOILET ECONOMY - Households (in US\$ million)		Baseline: Estimate of 2022 market size	Projection: 2025 progress towards universal access	Projection: Universal access in 2030
Urban				
New Toilet Installation			18.34	34.74
Toilet Cleaning Products		121.11	129.96	145.94
Repair and Maintenance of the Facilities		144.00	160.75	187.78
Soap		11.40	14.60	19.87
Total Urban		276.51	323.65	388.33
Rural				
New Toilet Installation			22.76	47.17
Toilet Cleaning Products		311.51	334.27	375.36
Repair and Maintenance of the Facilities		256.60	285.77	356.55
Soap		28.62	36.63	49.86
Total Rural		596.73	679.43	828.94
Toilet Paper Segment		380.37	470.69	671.35
Household Toilet Segment		1,253.61	1,473.77	1,888.62

Table 2: Kenya Institutions Toilet Market

MARKET ESTIMATES FOR TOILET ECONOMY - Institutions (in US\$ million)		Baseline: Estimate of 2022 market size	Projection: 2025 progress towards universal access	Projection: Universal access in 2030
School	Toilet Cleaning Products	9.55	10.87	12.93
	Toilet Cleaner Services	10.17	12.00	14.82
Hotel	Toilet Cleaning Products	2.43	2.75	3.26
	Toilet Cleaner Services	2.58	3.04	3.73
Offices	Toilet Cleaning Products	24.96	28.38	33.76
	Toilet Cleaner Services	132.80	156.71	193.48
Airport	Toilet Cleaning Products	0.02	0.02	0.02
	Toilet Cleaner Services	0.11	0.12	0.13
Hospital	Toilet Cleaning Products	40.37	44.89	51.59
	Toilet Cleaner Services	34.37	39.66	47.30
Public Toilets	Toilet Cleaning Products	0.25	0.29	0.34
	Toilet Cleaner Services	0.67	0.79	0.98
Subtotal Toilet Cleaning Products		77.58	87.19	101.91
Subtotal Toilet Cleaner Services		180.70	212.32	260.45
Institutions Toilet Segment		258.28	299.51	362.36

Toilet Economy Market Insights

Current Market Situation

- 1. Pit latrines are the most common sanitation facility available (73% of households).** More households use pit latrines in rural areas (86%) than urban areas (52%).¹⁵ Flush and pour flush facilities, on the other hand, are more prevalent in urban areas (46%) than rural areas (2%).¹⁶
- 2. There is a strong non-governmental organization (NGO) involvement and a growing trend towards private sector participation.** The key market player is Lixil, the manufacturer of SATO products across the country. The rise of social enterprises such as Sanergy and Sanivation have also helped address the challenges of sanitation, particularly in low-income communities that are underserved by traditional market players.
- 3. There is a defined market for toilet care products and toilet papers.** Toilet care products registered increased sales reaching 645 million KES (US\$ 5.23 million) in 2022,¹⁷ while toilet paper was a 10 billion KES (US\$ 81.02 million) market in 2022.¹⁸
- 4. Household sanitation facilities are mostly constructed by the household.** In a 2019 survey by Kenya Sanitation and Hygiene Improvement Program (KSHIP) in 11 sub counties (1,968 households), average cost of improved sanitation was reported to range from 2,000 KES (US\$ 123) in Murang'a to 30,000 KES (US\$ 243) in Nakuru.¹⁹ Latrines were mostly (66.5%) constructed by household members, while others were constructed by local artisans (28.8%).²⁰

Market Drivers

- 1. The government encourages strong private sector participation and investment.** Kenya Environmental Sanitation and Hygiene Policy (KESHP) 2016-2030 acknowledges the role of the private sector in the delivery of sanitation and hygiene products and services. The policy requires the development of an enabling environment for the private sector, acceleration of appropriate sanitation technologies for the poor, creation of market-compatible financing options, and the promotion of sanitation marketing.²¹
- 2. Rising awareness of the importance of investing in sanitation facilities.** In one study in 2013, households associated latrine owners with positive qualities (e.g. energetic, clean, wealthier and confident), while non-latrine owners were perceived negatively (e.g. lazy, unwelcoming and sickly).²² Social stigma around poor sanitation facilities could drive households to improve their facilities.
- 3. There is an increased demand for sanitation facilities.** With a growing population and urbanization, there is an increasing demand for sanitation facilities in Kenya. The government and NGOs are working to improve access to toilets, but there is still a significant gap in the market that can be filled by the private sector.
- 4. There is a willingness to pay for improved sanitation.** A study found that households' willingness to pay for improved sanitation was influenced by a variety of factors, such as income and education levels, gender, household size, and access to improved water sources. Households with higher income and education levels were more willing to pay for improved sanitation.²³

Market Barriers

- 1. High cost remains the primary access constraint, including during the COVID-19 pandemic.** In a study by USAID assessing the impact of COVID-19 on access to WASH, 15% of the consumers reported having difficulty in buying, installing, or upgrading latrines while 84% struggled with non-affordability. Spending for new sanitation facilities and pit emptying services were also low priority, especially for low-income earners.²⁴
- 2. Low intersectoral collaboration is a barrier to accelerate sanitation initiatives.** Kenya's water supply and sanitation sector is fragmented with multiple agencies and entities tasked with responsibilities across the sector.²⁵ Coordination and collaboration is poor, with inadequate information sharing and cooperation among key stakeholders.
- 3. Households give low priority to sanitation.** This could be due to several reasons, namely social-economic barriers, lack of credit arrangements for poor households to invest in sanitation, low awareness on health benefits, lack of privacy or availability of infrastructure development such as availability of piped water.²⁶
- 4. Open defecation is deemed the best option among nomadic populations.** Mobile lifestyles cause resistance to latrine use, since carrying latrine materials is not convenient. However, populations become open to latrine use if they transition to a more settled way of life.²⁷

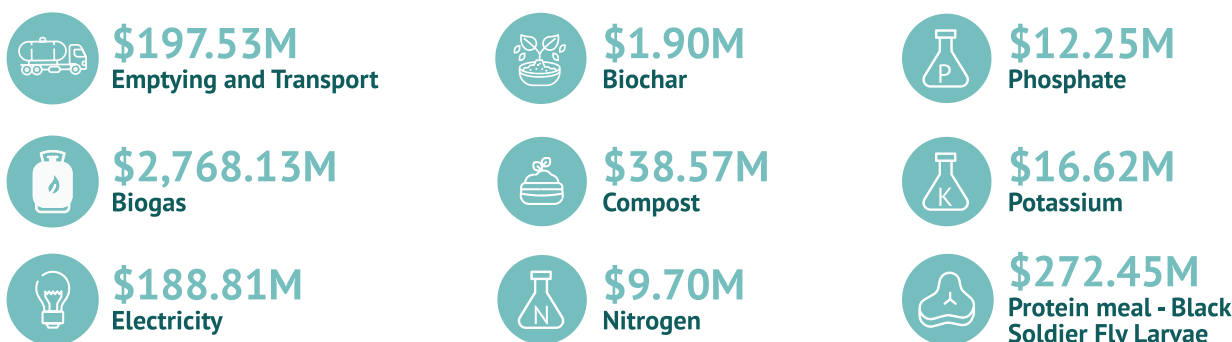
Market Opportunities

- 1. Kenya has limited public funds to meet WASH targets by 2030, so there is interest in private financing.** In order to expand and improve WASH services, it is estimated that 1,592 billion KES (US\$ 12.9 billion) worth of investment is required.²⁸ However, the allocated budget by the government for water and sanitation is only 691 billion KES (US\$ 5.6 billion), resulting in a significant gap of over 864 billion KES (US\$ 7 billion).²⁹ The government has put in place policies and initiatives that support private sector involvement, which can be leveraged by private sector players to tap into the market opportunities in the toilet economy.
- 2. Investments in sanitation infrastructure are requested.** There is a clear need for investment in the construction and rehabilitation of sanitation facilities such as toilets and latrines.
- 3. There is demand for low-cost, durable, safe sanitation facilities due to low household incomes.**³⁰ There is a growing demand for innovative toilet solutions that are sustainable, cost-effective, and easy to maintain. The development of new sanitation technologies, such as low-cost sanitation solutions and mobile sanitation units, can create new market opportunities for companies that offer innovative solutions.

Circular Sanitation Economy

The **circular sanitation economy** appears to be on a favorable track due to the country's immense need for faecal sludge management services, energy and agricultural products. The surge in the price of agricultural products, due to the current Ukraine-Russia conflict has further triggered the demand for locally-produced fertilizers. The market for emptying and transport is relatively strong, with an estimated value of US\$ 118.2 million in 2022 and the potential to reach US\$ 197.5 million by 2030. In terms of resource recovery, biogas shows the largest potential, with an estimated value of US\$ 719.8 million in 2022 and the potential to grow to almost 4 times that size, eventually reaching US\$ 2.8 billion.

MARKET ESTIMATE FOR 2030 CIRCULAR SANITATION ECONOMY* (IN US\$ MILLION)



*Note that this report does not total the estimates in the Circular Sanitation Economy as only one product can be produced from a volume of waste. Stakeholders are encouraged to look not only at the potential revenue of products but also, from a circular economy perspective, at retaining the value of the product. For example, biogas is a significant leader in financial potential, enables greener cooking and produces a liquid fertiliser. For the overall sanitation economy estimate, Protein Meal product is selected as it promises moderate financial returns while also contributing back to the food system.

Table 3: Kenya Circular Sanitation Market

MARKET ESTIMATE FOR CIRCULAR SANITATION ECONOMY (in US\$ million) ³¹	Baseline: Estimate of 2022 market size	Projection: 2025 progress towards universal access	Projection: Universal access in 2030
Emptying and Transport	118.17	133.91	197.53
Biogas	719.81	1,437.99	2,768.13
Electricity	49.10	98.08	188.81
Biochar	0.49	0.99	1.90
Compost created	10.02	20.04	38.57
Total nitrogen	2.522	5.04	9.70
Total phosphate	3.18	6.36	12.25
Total potassium	4.32	8.63	16.62
Protein meal/black soldier fly larvae	70.85	141.53	272.45

Circular Sanitation Economy

Market Insights

Current Market Situation

- 1. Most Kenyans (70%) use on-site sanitation, opening opportunities for emptying and transport.** Only 10% of Kenyans are catered for by mechanical emptiers and 40% by manual emptiers in Nairobi, leaving 50% currently un-served.³²
- 2. Faecal sludge emptying, transport, and treatment are part of Water and Sanitation Program's (WSPs) mandate.** Under the 2016 Water Act, sludge emptying, and transport are part of WSP's tasks. However, most of them lack equipment, such as vacuum trucks, to do so and leave it to the private sector to manage. Treatment services are also part of their mandate, and yet due to a lack of facilities, faecal sludge rarely reaches a treatment or disposal facility.³³
- 3. Licensing system for mechanical faecal sludge emptying supports market development. Some counties have a licensing system in place for operators involved in mechanical faecal sludge emptying.** In Kisumu, Nairobi and Mombasa, in addition to their trading license, vacuum tank operators need to obtain a license from the National Environment Management Authority (NEMA) and a tipping license issued by the utility company.³⁴ License fees can be issued for each truck (as in Kisumu) or on a dumping basis (as in Nairobi and Mombasa). In Nairobi, operators also require an exhausting (emptying) license issued on a truck-by-truck basis.³⁵
- 4. Treatment capacities for faecal sludge is very low in Kenya.** The infrastructure for the treatment of faecal sludge in Kenya is limited, with few treatment plants and facilities available. This makes it difficult to manage the large quantities of waste generated in urban and peri-urban areas.

Market Drivers

- 1. An Environmental Management & Coordination Act (EMCA) guides waste management in Kenya.** This Act lays the framework law on environmental management and conservation. It provides for environmental protection through environmental impact assessment, environmental audit and monitoring, environmental restoration orders, conservation orders, and easements.³⁶ Policies such as EMCA bring stability to the circular sanitation economy, while supporting the prioritization of waste recovery, treatment and reuse.
- 2. The country has shifted towards circular economy thinking. Kenya is known to be a hotspot for circular economy innovations.** In 2017, the Kenyan government launched the Green Economy Strategy and Implementation Plan (GESIP) to initiate a transition to a green economy and contribute to sustainable development efforts.³⁷ The plan aims to promote sustainable infrastructure, sustainable natural resource management, resource efficiency, among others.
- 3. National development is guided by Kenya Vision 2030.** This long-term development blueprint seeks to transform Kenya into a middle-income country by the year 2030.³⁸ One of the pillars of this vision is ensuring sustainable environment and water resources management. Circular sanitation is a key aspect of this pillar, as it promotes the safe and sustainable use of toilet resources.
- 4. There is a growing interest in recovery and reuse of resources from sanitation facilities in Kenya.** Resource recovery approaches such as biogas production, composting, and fertilizer production are being promoted as a way to create value from waste and generate additional revenue streams.

Market Barriers

- 1. Houses are difficult to access and the market lacks adequate emptying technology.** In many areas, houses are closely packed together, and access to individual houses for mechanical emptying can be difficult due to narrow roads or limited spaces. Many private sector emptiers in Kenya use manual methods for emptying pit latrines and septic tanks, which can be time-consuming, labor-intensive, and pose significant health risks to workers. There is a need for appropriate equipment, such as vacuum trucks, to enable faster and safer emptying.
- 2. Regulations and policies need to be further developed to promote circular sanitation and provide guidance for its implementation.** This can include the development of standards for waste treatment, guidelines for the reuse of treated waste, and incentives for the adoption of circular sanitation systems.
- 3. Lack of human resources, capacities, and technologies can be a challenge to implement circular sanitation systems.** As circular sanitation is still a growing concept, capacity building through training programs and workshops is essential to ensure that individuals and institutions have the knowledge and skills to develop and operate circular sanitation systems effectively.
- 4. Faecal sludge emptying and treatment is costly.** Mechanical emptying is usually around 1.110,8 KES/m³ (US\$ 9) in Nairobi, 1.851,3 KES/m³ (US\$ 15) in Mombasa and 863,9 KES/m³ (US\$ 7) in Kisumu. In Kisumu, due to limited budgets, households turn to non-regulated manual emptying which costs 3.702,6 KES (US\$ 30) per trip compared to 6.417,8 KES (US\$ 52) for regulated emptying. Additionally, toilet resources, in particular, can be difficult and expensive to treat and reuse, especially in areas without adequate infrastructure and resources.
- 5. Negative perception persists around reused toilet resources.** There is a mix of cultural and social attitudes towards the reuse of toilet resources. While compost fertilizers are now being used in agriculture, there are still cultural and social taboos around toilet resources that can make it challenging to promote its reuse. The public still views it as dirty and unpleasant, and there can be a stigma associated with handling or working with it. Additionally, there are concerns about the safety and hygiene of using human waste as a fertilizer, particularly if it is not properly treated and processed.
- 6. Private emptiers lack incentives.** Due to gaps in willingness-to-pay and market prices, large subsidies may be needed for private emptiers to thrive. In one study in Kisumu, Kenya, it was estimated that 55.1 to 81.4 million KES (US\$ 551,000–814,000) is needed to improve faecal sludge management in low-income neighborhoods in the area.³⁹ Subsidies and tax breaks could be targeted to improve viability and profitability of their business. In addition to financial incentives, there may also be opportunities to provide technical assistance and support to help private emptiers improve their operations and access to markets.

Market Opportunities

- 1. The establishment of faecal sludge treatment plants (FSTPs) is needed.** Using the country's urban population and estimated waste generation, a simple projection of the required FSTPs in Kenya is carried out.⁴⁰

Estimated FSTPs needed	2022	2025	2030
Nairobi Metro	30	81	111
Nairobi City & Mombasa	50	136	186
Town Class 1 (28 Towns)	0	8	14
Town Class 2 (73 Towns)	0	3	5

2. Wastewater treatment is needed. One study revealed that only 30% of the wastewater in Nairobi and Nakuru is treated, entailing a need for treatment and reuse. Nairobi City is estimated to generate approximately 400M liters of wastewater per day. Nakuru generates 29M liters.⁴¹

3. Private sector participation is needed in design standardization of on-site sanitation system (OSS). Construction firms may be engaged to establish more efficient OSS designs due to their access to resources, technology, and expertise. The private sector can also invest in research and development of sustainable OSS designs. Public-private partnerships may be a helpful platform for collaboration and joint investment in sanitation infrastructure.

4. Transfer stations fortify business viability. Transfer stations can help address some of the challenges associated with transporting faecal sludge directly to treatment facilities, such as long distances, difficult terrain, and high costs. By strategically locating transfer stations, it is possible to reduce the distance that faecal sludge transporters need to travel to reach treatment facilities, which can help to lower costs and improve efficiency.

Smart Sanitation Economy

The **smart sanitation economy** is valued at US\$ 8.2 million in 2022, with the potential to more than triple to US\$ 30.2 million. Growth is likely to accelerate as power access and internet connectivity improve.

MARKET ESTIMATE FOR 2030 SMART SANITATION ECONOMY (IN US\$ MILLION) PROJECTION Universal Access

 **\$0.02M**
Government Investment
in Smart Sanitation

 **\$24.32M**
Sensor and Smart
Technologies for Toilets

 **\$1.92M**
Sensor and Smart
Technologies for FSTPs

TOTAL PRODUCTS
\$26.26M

 **\$2.44M**
Data Analytics
Services

 **\$1.49M**
Mobile Application
Services

TOTAL SERVICES
\$3.93M

**SMART SANITATION
ECONOMY**

\$30.19M



Table 4: Kenya Smart Sanitation Market

MARKET ESTIMATE FOR SMART SANITATION ECONOMY (in US\$ million)	Baseline: Estimate of 2022 market size	Projection: 2025 progress towards universal access	v
Product			
Government investment in smart sanitation	0.02	0.02	0.02
Sensor and smart technologies for toilets	6.03	12.87	24.32
Sensor and smart technologies for FSTPs	0.49	1.39	1.92
Total Product	6.54	14.27	26.26
Services			
Data Analytics Services	0.72	1.44	2.44
Mobile Application Services	0.98	1.18	1.49
Total Services	1.71	2.62	3.93
Smart Sanitation Economy	8.24	16.89	30.19

Smart Sanitation Economy Market Insights

Current Market Situation

1. ICT applications exist for WASH. A few technologies for WASH have been introduced in Kenya usually for data collection and analysis related to water supply.⁴²

Company	Description
Maji Voice	Mobile to web system based on open-source software that serves as a platform for consumers to log their complaints to the WSP.
WARIS	Web-based database with performance indicators reported on by WSBs and is used for preparing the annual WASREB impact report.
Jisomee Mita	Web-based ICT platform that enables water consumers to use a mobile phone to query and receive current water bills at a frequency of their convenience by sending their meter reading to NCWSC and receiving instant feedback.
Mobile field assistant	Mobile meter reader, the "mobile field assistant" to perform meter reading functions.
Mmaji	Mobile phone-based application that provides information to customers in informal settlements on availability and price of water in order to support informed decisions on which public water point to purchase from.
WASPA MIS Tool	Water service providers association (WASPA) operates an internal performance review mechanism for member WSPs that collects data on 54 key performance indicators (KPIs).
Powwater	An application for vacuum trucks in Nairobi and Mombasa. ⁴³

Market Drivers

1. Kenya has a Digital Masterplan 2022-2032 which can inform smart sanitation economy development.

The Kenyan government launched its 10-year Digital Masterplan 2022-2032 to drive technological advancements and the digital economy in the country. Although there is no roadmap for the smart sanitation economy yet, this could be a powerful next step. The government has also allocated 16,291.4 billion KES (US\$ 132M) for ICT initiatives for 2022/2023.⁴⁴

2. Kenya is part of Smart Africa Alliance and demonstrates leadership on smart technologies. Kenya is a member of the Smart Africa Alliance Initiative and plays a strong role in the approach to the digital economy. As Kenya's use of digital technologies for other essential services grows, we anticipate a willingness to embrace smart sanitation approaches as well.⁴⁵

Market Barriers

1. Kenya still has slow and expensive internet connection. Mobile internet in Kenya is 2 times slower while broadband is 3 times slower compared to South Africa. Prohibitively, 1GB of mobile internet in Kenya is still 13 times more expensive than in South Africa.⁴⁶

2. Smart sanitation devices face increased security risk. Smart sanitation devices, such as sensors and monitoring systems, rely on advanced technology that can be expensive to install and maintain. Vandalism can be a particular challenge in low-income communities where security is often an issue, and there may be limited resources available to invest in security measures. Vandalism and theft of equipment can significantly impact the functionality of these systems and may require frequent repairs or replacements, which can be costly.

3. Groundwork must be done to prepare for and move towards digitalization. Digitalization of sanitation involves the use of technology and data to improve sanitation outcomes, including the use of smart devices to monitor and manage sanitation systems, as well as the use of data analysis to inform decision-making. It is important to engage with communities and stakeholders, especially the private sector to raise awareness and build local capacity for the maintenance and management of these technologies.

Market Opportunities

1. Sanitation and wastewater testing for antibiotic use could be a starting point. From a public health perspective, Kenya is grappling with an accelerating challenge of antibiotic resistance. Sanitation and wastewater testing for antibiotic use could prove a valuable data stream to understanding usage in the country.⁴⁷

2. Big data for sanitation at a national level is limited. While there are some data sources available, such as government statistics on access to improved sanitation facilities and basic demographic data, a lack of comprehensive and standardized data on sanitation services and outcomes across the country persists. Leveraging emerging technologies such as mobile data collection and satellite imagery to improve data collection and analysis in the sanitation sector has huge potential in Kenya.

3. Call centers for waste emptying hold transformative potential. Call centers can provide a centralized point of contact for households and businesses to request faecal sludge emptying services. These could help streamline service delivery as well as improve the overall efficiency and quality of sanitation services in the country. Private sector players, such as private emptiers, could potentially partner with call centers to expand their customer base and increase their revenue streams.

4. Increased compliance through the regulation of exhaust services using smart applications is possible. Smart applications that track the volume of waste collected and transported and discharged by vacuum trucks can also be an additional market opportunity for the private sector. This could help the government effectively monitor and enforce compliance with sanitation standards, including safety and environmental regulations.

Showcase

Innovations can drive consumer demand for sanitation, but it is more than just the toilets. The Toilet Board Coalition hosts an accelerator program that scales up essential innovations in toilet design, circular recovery of biological resources, smart digital technologies and menstrual hygiene products to ensure safe and sustainable sanitation for all. This section highlights sanitation solutions from the Coalition's portfolio plus Elphrods Services that are scalable, innovative, replicable, commercially viable and responsive to the needs of emerging markets in Asia and Africa.

Toilet Economy

Company name CleanTeam

Year Founded 2010

Country of Operations Ghana

Solution CleanTeam Ghana



Problem that you were trying to solve Inadequate sanitation facilities in low-income communities



Description of the Solution CleanTeam offers portable toilets to low-income users in Kumasi, Ghana. CleanTeam uses a product-as-a-service model and charges monthly fees for toilet servicing, rental and waste collection thrice weekly. Waste collected from the toilet facilities is disposed of at the municipal treatment center.



Impact Over 600 toilets were installed, providing access to improved sanitation to 4,500 people.



Contact Information Abigail Aruna

Company name Elphrods Services LLP

Year Founded 2021

Country of Operations Kenya

Solution Affordable and inclusive WASH credits



Problem that you were trying to solve Inaccessible water and sanitation services in low-income areas



Description of the Solution Elphrods Services LLP offers small credits for small and medium-sized businesses and households wanting to improve their WASH facilities and matchmaking with WASH service providers (i.e. manual pit emptiers, exhausters, plumbers, utilities and master operators). The WASH credits enable them to connect their facilities to water piping networks, access formal pit emptying services and upgrade their pits to meet the required standards.



Impact Over 1,000 households have benefitted from the program since its inauguration.



Contact Information Denish Owiti



Circular Sanitation Economy

Company name Pit Vidura

Year Founded 2016

Country of Operations Rwanda

Solution Faecal sludge emptying and transportation



PIT VIDURA



Problem that you were trying to solve Unsafe and unsustainable faecal sludge emptying and transportation



Description of the Solution Pit Vidura is a sanitation logistics company that targets low-income communities with no access to public sewerage systems. It offers a quick and clean waste management solution to poor households and currently maintains over 960 toilets annually.



Impact Pit latrines are emptied annually (as opposed to every seven years prior to Pit Vidura) at a relatively affordable rate of US\$ 8.50 per household annually.



Contact Information Nicolas Kuria

Company name Kaka Cesspool Services

Year Founded 2018

Country of Operations Uganda

Solution Faecal sludge management services



KAKA CESSPOOL SERVICES



Problem that you were trying to solve Inadequate and unsafe faecal sludge emptying services in Uganda



Description of the Solution Kaka Cesspool Services is a faecal sludge emptying and transportation company that serves households in Uganda, including those in congested slums, which were deemed inaccessible. Faecal sludge is safely collected and transported to the treatment plant.



Impact Over 2,262 households were emptied – equivalent to 4,020 m³ volume – in 2022. Employment opportunities, especially for the young, were also created in their respective communities.



Contact Information Derrick Matovu



Smart Sanitation Economy

Company name Garv Toilets

Year Founded 2017

Country of Operations India, Ghana, Nigeria

Solution Smart portable toilet cabins



Problem that you were trying to solve Lack of sustainable toilets for public use, especially for women and the disabled



Description of the Solution Garv Toilets offers a 'Smart toilet' solution, with self-cleaning and automation, requiring no grid power or sewer lines and less capital to maintain. It is also specifically engineered for women and the disabled population.



Impact Serves 170,000 users daily with over 900 toilets deployed in 68 locations.



Contact Information Mayank Midha



A Forward Look

“ The world keeps moving further away from achieving the Global Goals. We know how to get back on track. What we need is unity of purpose, effective leadership from all sectors and urgent, ambitious action. ”

António Guterres, Secretary-General of the United Nations

The sanitation economy provides sustainable and complementary solutions, monetizing toilet provision, products and services, biological resources, health data and information, to provide benefits across business and society. This report shows the unrealized US\$ 1 billion potential that exists in the sanitation economy in Kenya today and how opportunities will increase as these services expand to all Kenyans. The Sanitation & Hygiene Fund (SHF) is committed to realizing this potential and the immense economic, social and environmental benefits.

As we create demand for sanitation and drive gender equality, we call on our development partners, the investment community, philanthropists, the financial sector and private sector to also focus on market-based sanitation, hygiene and menstrual health.

Together we can



1. Build a dynamic pipeline of bankable projects in the sanitation economy. These investment propositions will focus on specific elements of the sanitation economy profiled in this report, and will lay out compelling business plans and clearly show the social, environmental and financial returns for investors.



2. Facilitate flow of investment into the sanitation economy. Together, we can align commercial investors, impact investors and philanthropists with the right type of investment opportunities. We will work with our partners to design innovative finance instruments to de-risk these investments and maximize the impact of funding from Kenya's development partners.



3. Strengthen the enabling environment to attract new and greater investments into the sanitation economy. We know that the economic potential highlighted in this report will only be realized when barriers to investment are removed and new incentives are put in place. We are putting in place concrete plans on various priority public reforms to address these bottlenecks and we invite all partners to support these crucial actions.

Social impact and financial return can co-exist. We can achieve safe sanitation for all, catalyze economic growth, eradicate poverty and ensure women's empowerment and job creation. We look forward to your support.

Annex

Sanitation Market Assessment (SMA) Western Kenya and Marsabit

USAID conducted a sanitation market assessment in Western Kenya and Marsabit to identify the drivers and barriers for market-based sanitation. Among the barriers and drivers identified are:

Rural Western Kenya

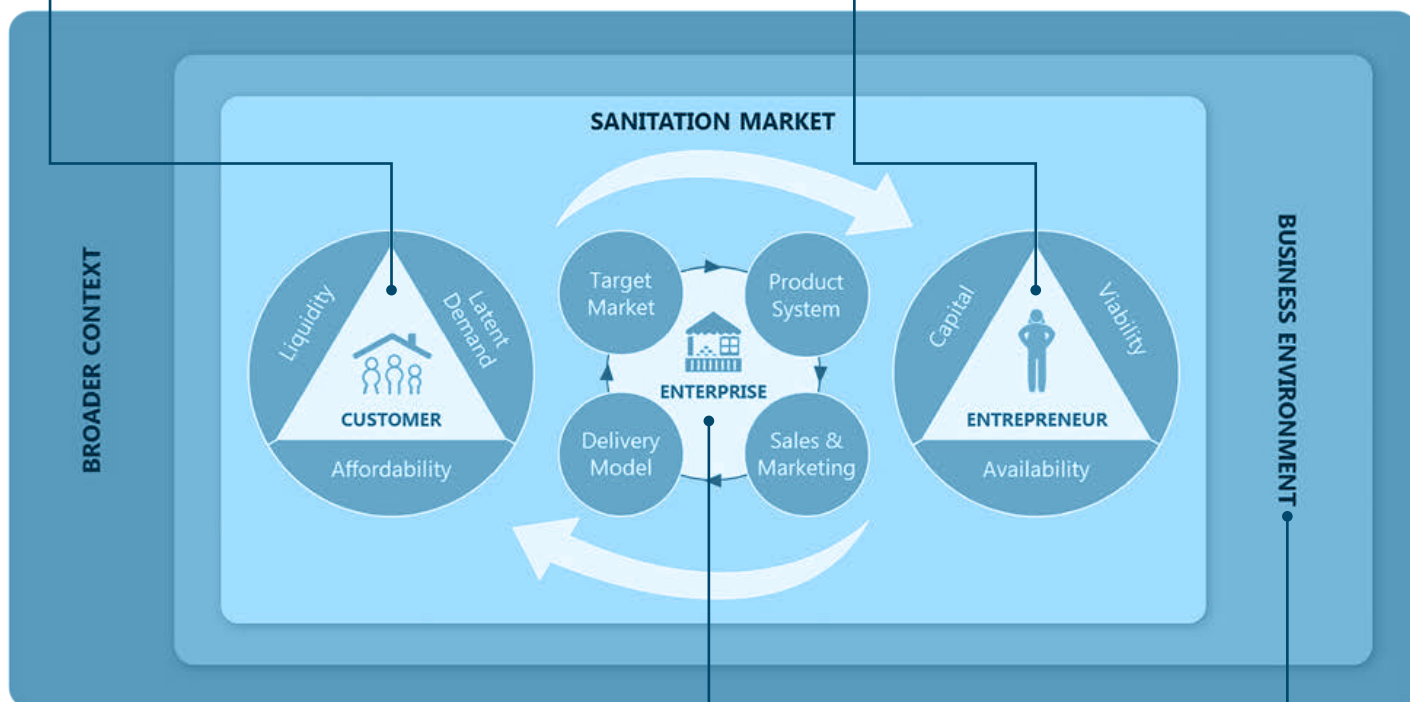
Barriers and Drivers | Customer

CUSTOMER

- High awareness of the benefits of sanitation
- Knowledge of durable toilet options
- Strong desire to improve the durability of toilets
- Significant proportion of households with a high ability to pay for durable toilets
- Poorer households with a low ability to pay market prices for durable toilets
- Reluctance to take loans for sanitation for fear of inability to pay back

ENTREPRENEUR

- Availability of full-time and part-time fundis
- Part-time fundis' limited skill in durable products
- Sanitation as primary source of income for full-time fundis
- Full-time fundis' willingness to stock materials
- Viability of sanitation business line for all entrepreneurs
- Inaccessibility of formal loans and working capital challenges for fundis
- Access to formal loans and positive cash flows for hardware stores



ENTERPRISE

- Households' willingness to engage with 3-4 market players to construct toilets
- Lack of information seeking by households and distrust of funds by households
- Wide range of products across price points
- Incorrect perception of durable toilets being expensive
- Challenges in reducing costs or introducing new products
- Presence of CHVs who are trusted and promote sanitation
- Limited capacity of CHVs to do sales and marketing

BUSINESS ENVIRONMENT AND BROADER CONTEXT

- Well-established supply chains for construction materials
- Poor quality roads limiting potential market for pre-fabricated product
- Lack of training on durable products
- Support from county government for MBS efforts
- Reluctance to take loans for fear of inability to pay back

Urban Marsabit

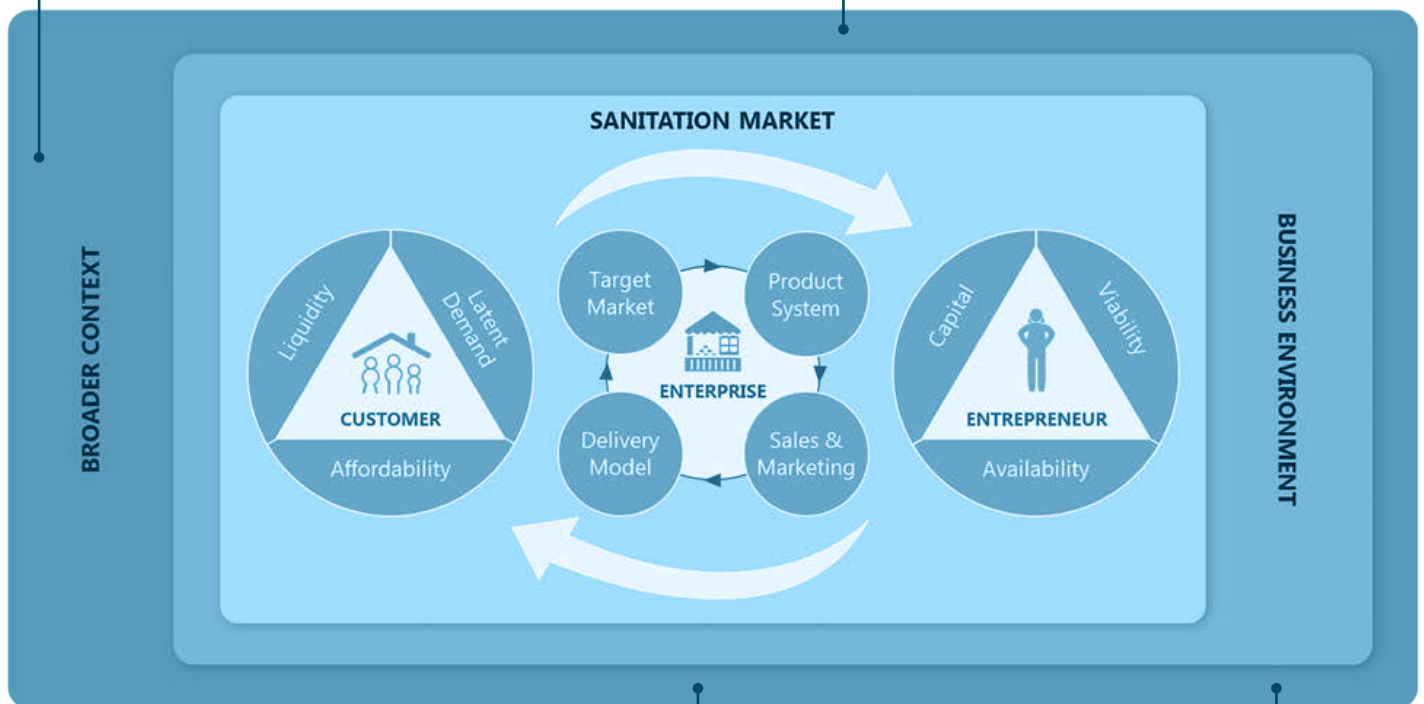
Barriers and Drivers | Overall summary

CUSTOMER

- High awareness of the benefits of sanitation
- Knowledge of durable toilet options
- Low willingness to invest in durable toilets
- Significant proportion of households with a low ability to pay market prices for durable toilets
- Reluctance to take loans for fear of inability to pay back

ENTREPRENEUR

- Availability of full-time and part-time fundis
- Part-time fundis' limited skill in durable products
- Viability of sanitation business line for all entrepreneurs
- Limited viability of sanitation as a stand-alone business
- Reluctance of full-time funds to stock materials
- Working capital challenges
- Reluctance to take loans



ENTERPRISE

- Households engaging with 5-7 players to construct toilets
- Information-seeking behavior by households
- Low affordability of durable toilets
- High costs for constructing durable toilets
- Challenges in introducing new products
- Near-absence of sales and marketing by market players

BUSINESS ENVIRONMENT AND BROADER CONTEXT

- Dispersed supply chains for construction materials
- High costs of construction materials
- Well-established network of transporters improving accessibility to construction materials
- Adequate choice of suppliers for households

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