WATER TALKS:

ENGAGING CUSTOMERS IN THE EVALUATION OF WASTEWATER TREATMENT INVESTMENTS

Samuel Hawthorne, Keaton Mangone,
Jeremy Peters, Jamie Shikichi

WPI

What is Willingness to Pay?

Willingness to pay is an economic value that refers to the maximum value a customer or end-user is willing to pay for a good or service. While this is generally considered to be a purely financial value, oftentimes other factors like construction and pre-existing biases can influence willingness to pay.

Factors that influence Willingness to Pay

Increased willingness to Pay	Decreased willingness to pay
Belief that government investments are inadequate	Belief that government is not investing resources correctly
Moral desire to improve quality of life for present and future generations	Concerns about odors or insect infestation
Reasons of ethical and ecological conscience	Pre-existing belief that the project will fail
Self-image and tourism	Satisfaction with current methods of management

Table of Factors Influencing Willingness to Pay

For example, an end user may be less willing to pay for a wastewater treatment solution if it requires extensive construction on or near their property. They may believe that the inconvenience to them, their family, their business, etc. outweighs the benefits of the treatment system.

Additionally, some users may be unwilling to pay due to concerns about the treatment plant producing odors or causing an insect infestation. In these situations, pursuing a treatment solution that will not cause these problems may be beneficial. Constructed wetlands are an example of an odorless treatment system.

Another important factor, especially in rural areas, is the impact of the community's views. If the majority of a community is willing to pay for a proposed system, individuals not willing to pay may be less likely to voice their concerns.

One significant factor that can encourage users to pay for a treatment solution is a desire to clean up their community. This factor in particular can have many layers, including preserving the environment, improving self-image, and a moral desire to improve quality of life for future generations.

Willingness to pay is a multi-faceted concept that is not only influenced by economic aspects but also social aspects. As such it is important to consider and explore the factors that may be influencing whether or not a resident is willing to pay.

Determining Willingness to Pay

To determine willingness to pay, you would ask residents to provide a price that they are willing to pay. However, residents may find it difficult to place a price on these services. Because of this, a better method is to provide residents with either a range of prices and ask them which ones they would be willing to pay or to determine the approximate cost prior and determine whether residents would be willing to pay this price.

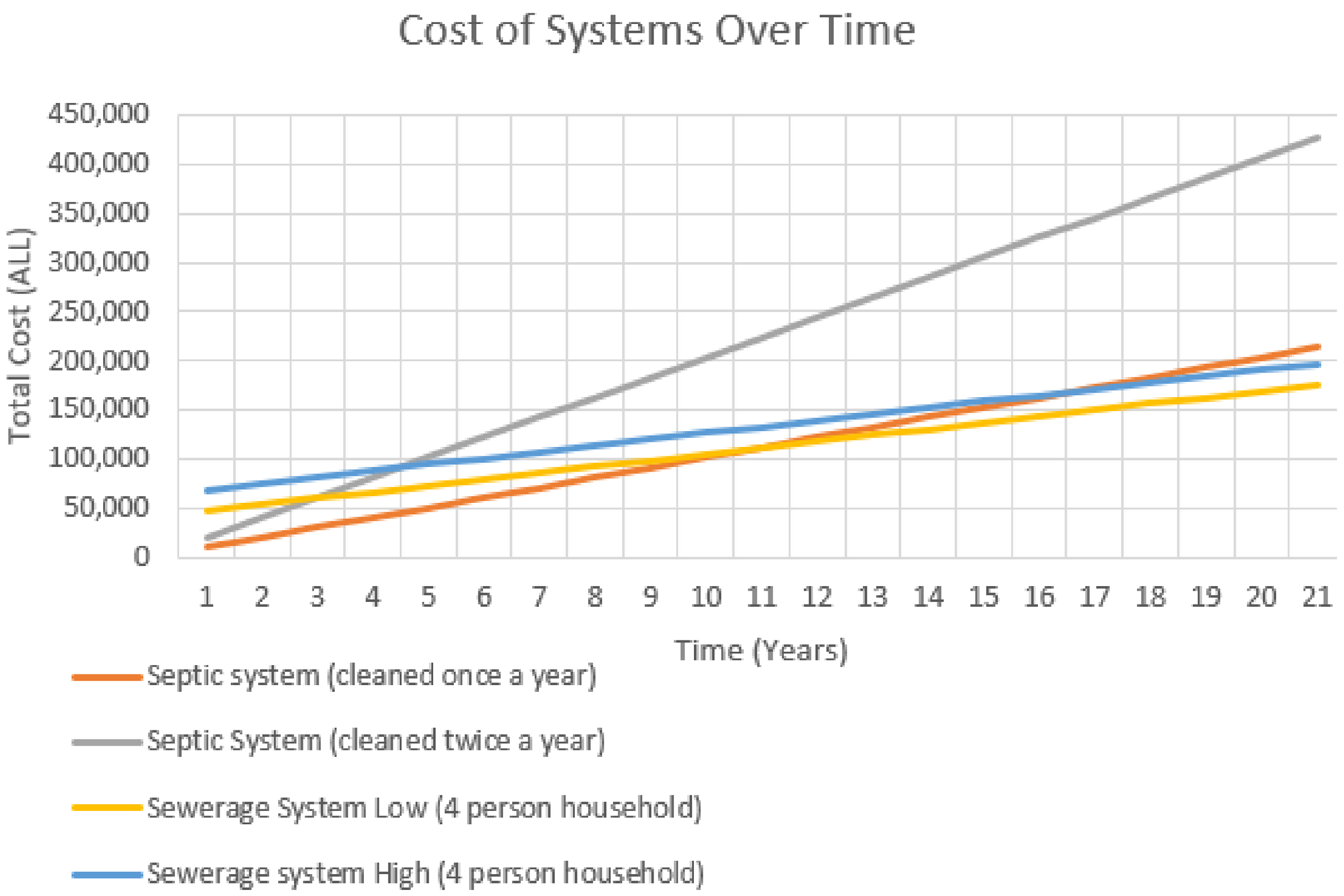
Another important consideration is the ability to pay. Some residents may feel as though the provided prices are fair however due to varying economic situations they may be unable to pay the price. If this arises it is important to note that the resident is in favor of the proposed system but may require government assistance or cross-subsidization to afford the implementation.

Cross-subsidization is the financial practice implemented by a local government or resource utility in which residents with a higher ability to pay for a service are also charged a surcharge to partially cover the cost of the service for residents unable to pay the full amount. This practice has been implemented worldwide to overcome the inability to pay of residents and has been favorable.

Several factors can influence willingness to pay, but largely the factor with the most impact is the price of construction and the operating and maintenance costs. An important consideration when talking to residents is remembering that for many these services will be expensive, but they have benefits. With a proper sewerage system, residents will no longer have to worry about cleaning their septic tanks which can be costly if done professionally or labor intensive if done by residents.

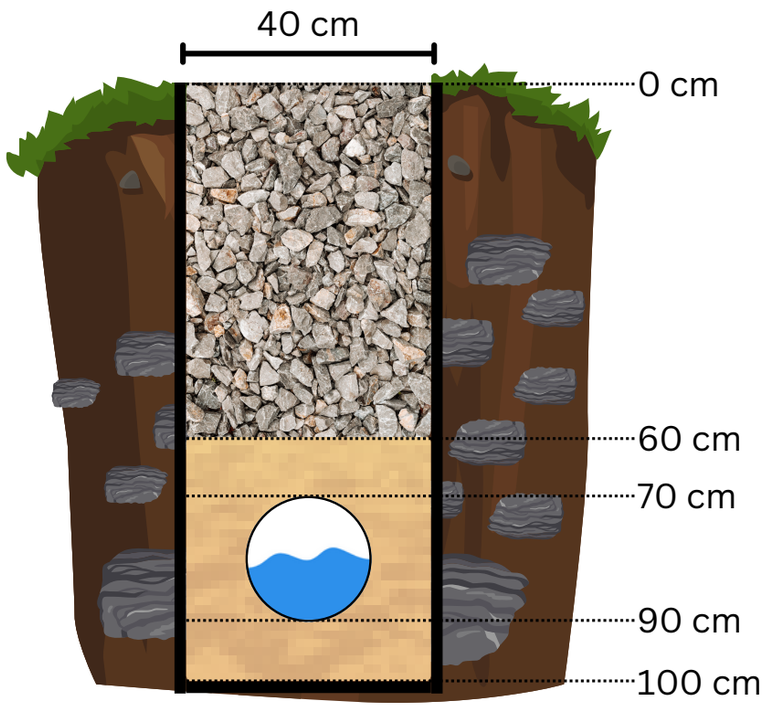
As such it is important to convey that this is an investment that will become cheaper over time. Below is a graph displaying the cost of different systems over time.

- After 5 years Cleaning a septic tank twice a year becomes more expensive
- After 11 years cleaning a septic tank once a year is more expensive than the low estimate
- After 17 years cleaning a septic tank once a year is more expensive



Determining Cost of Sewer Connection

Before determining willingness to pay it is helpful to estimate the cost for a resident to connect to a sewer system. To get an accurate and location-specific understanding it is important to contact an engineer. However an estimate can be obtained using the following considerations; excavation of dirt and rock, disposal of dirt and rock, cost of pipe, cost of sand and gravel, and labor.



Using local costs in the village of Shtiqen, and the diagram as shown the following calculations were performed to achieve an estimate for the cost per linear meter.

Approximate cost for connecting to main sewer lines for a Shtiqen household		
Type of pipe to be installed	HDPE SN8 Φ200mm	
Approximate length	1	ml
Approximate cross section for channel to dig		40x100 cm

No.	Description	Unit	Value
1	Excavation of hard rock soil for sewer channel	m3	360
2	Transportation of excavated material	m3	200
3	Supply and installation of HDPE SN8 Φ200mm sewer pipe	ml	1800
4	Supply and installation of sand around the pipe for protection of pipe, 10cm below pipe, 10cm above pipe	m3	193
5	Channel fill with gravel	m3	336
	Total cost per linear meter in Albanian LEK without VAT		2889
	VAT		577.8
	Total cost per linear meter in Albanian LEK with VAT		3466.8

Despite knowing the cost per linear meter, there are still several factors to consider such as the total distance to run the pipe, and any obstacles such as fences/walls around property.

To find the total distance for an individual household it is best to visit the site and measure. However, alternatively, a rough estimate can be obtained using satellite imagery. Several online tools such as Google Maps allow you to measure the distance between two selected points. In this example, since the final endpoint of the septic connection is unknown, an average between the closest and furthest point is taken, giving us an estimated distance of 30 meters.

In this example, we will assume that there is an exterior wall around the perimeter of the property. Consulting a local engineer, it was estimated that it would cost a total of 16,896 LEK to deconstruct and reconstruct the required section. Using the total distance of 30 meters, and multiplying by the cost per meter, it is estimated to cost a total of 104,004 LEK to construct the pipe.

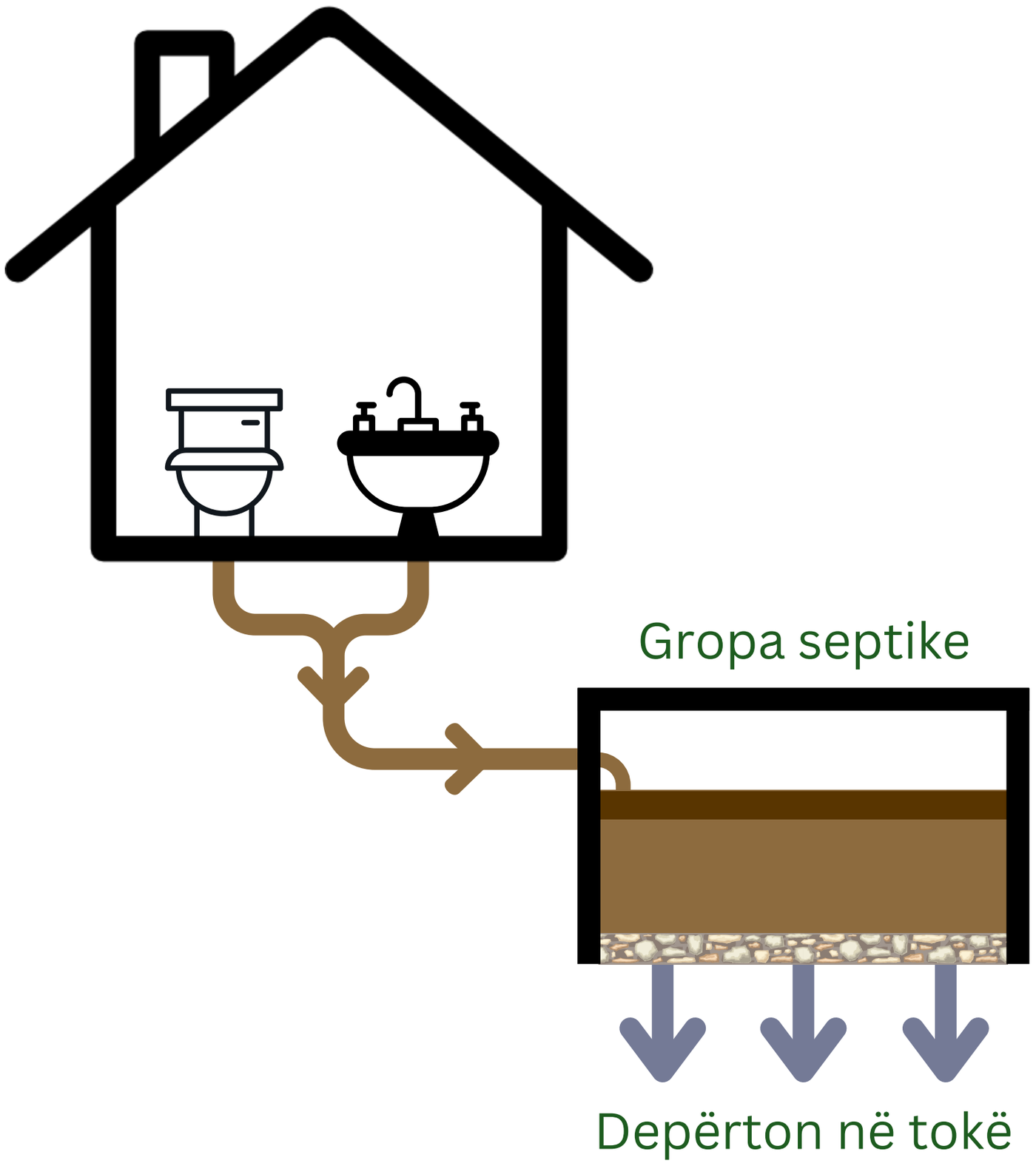
The Current System

Pictured below is a diagram showing a current management system.

Most households currently have a gravity septic tank in which wastewater is fed from household appliances like sinks and toilets. These septic tanks drain water directly into the soil and collect solid waste for eventual cleaning. Cleaning of these septic tanks occurs 1-2 times per year and is typically either done professionally (for 100€) or manually by the residents.

Having a diagram like this in combination with one of a proposed system (see next page) can be useful as a way for individuals to visually compare the two systems. This can allow them to conceptualize the changes and benefits that come with a more robust wastewater treatment solution.

While many of these gravity septic tanks are shallow and require regular cleaning by some residents, it is important to acknowledge that residents may have built their tanks to be deeper than average. This is often done to limit the number of cleanings required for the tank, and residents with systems like these are less likely to be willing to pay.



The Proposed System

Pictured below is a diagram showing the proposed treatment system.

The top shows a front-facing view with pipes collecting wastewater from household appliances like sinks and toilets. This wastewater is then collected into a larger main pipe below the road. Every household's wastewater is collected in these pipes and transported to a treatment plant, in this example the treatment system is a constructed wetland.

Diagrams like this can be useful to help communicate the extent of construction required for a proposed system, such as needing to tear up roads or take down walls. Without these diagrams, residents may not express concerns surrounding construction.

Even though some residents may not care about the specifics of the treatment system it is still important to discuss these details; as they may influence residents' willingness to pay especially if the resident lives in proximity to the site for the proposed treatment system.