

# TAP 21

# BACHELOR THESIS

The design of a  
purifying water  
system that convinces  
the East African  
citizens to use it

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Bachelor Assignment



Tap 21

The design of a purifying water system that convinces the East African citizens to use it

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# Preface

The document in front of you contains the elaboration of my Bachelor Assignment. This assignment concerns the development of a purifying water system for developing countries in east Africa. During the design process the focus shifted mainly towards a critical usage point. The most important research question is : How can the inhabitants be attracted to use this purified system and its water?

I enjoyed working on this assignment a lot, and therefore I want to thank Susteq and its employees. They gave me the feeling that I was welcome and I felt very involved in the company, they gave me a lot of responsibilities. I have always felt as a part of the team. I hope that my design and research is very usefull for the company and that they will continue the developing of the complete Tap 21.

I also would like to use this opportunity to thank Hans Tragter, my supervisor from the University of Twente for all his time and feedback during this assignment. Furthermore I would like to thank my supervisor from Susteq, Anton Lepelaar for the discussions, feedback and all his help to fullfil this assignment. At last I would like to thank my mother, who was a great help during this assignment.

Tessa Fij,  
12-09-2016

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# Samenvatting

De opdrachtgever Susteq is een Social Enterprise die als doel heeft om prepaid water systemen voor ontwikkelingslanden te ontwikkelen. Susteq gelooft dat iedereen het recht heeft op betrouwbaar, schoon en gezond drink water. Om dat te bereiken plaatst Susteq in combinatie met plaatselijke NGO's (niet-gouvernementele organisaties) duurzame water punten. Op dit moment is het hoofddoel van Susteq het plaatsen van systemen in Oost Afrika, onder andere in Kenia en Tanzania. De watervoorzieningen in deze landen zijn erg onbetrouwbaar en de waterkwaliteit en de hoeveelheid vervuiling verschilt erg veel.

Om echt iedereen van betaalbaar veilig drinkwater te voorzien is Susteq bezig met het ontwikkelen van de Tap 21. Dit is een tappunt waarin een betalingsysteem wordt gecombineerd met gepaste zuivering per locatie. Deze Bachelor Opdracht is een onderdeel van deze ontwikkeling. Deze opdracht zal toegespitst worden op de gebruikers interactie met het systeem en om op het optimaliseren van het ontwerp naar de behoeftes van de lokale bevolking.

De opdracht is begonnen met een onderzoek naar de gebruikers, de omgeving en de al bestaande water zuivering systemen. Om de beste inzichten te krijgen in de gebruikers, hun gedrag en de omgeving, zijn er interviews gedaan met lokale NGO's. Uit deze onderzoeken zijn drie oplossingsrichtingen ontstaan die in het veld onderzocht zijn. De eerste richting is educatief van aard, de tweede marketing gerelateerd, en de laatste gericht op de luxe uitstraling.

Vervolgens is een onderzoeksplan opgesteld met bijbehorende interviews. Het onderzoek is gericht op het testen van de functionalliteit van de drie oplossingsrichtingen. Bij vier verschillende bestaande water projecten in Kenia is onderzoek gedaan. Er zijn observaties gedaan van de verschillende locaties en van het gebruik van deze waterpunten. Vervolgens zijn er interviews gehouden met gebruikers en shopeigenaren. Daarnaast hebben er ontmoetingen plaatsgevonden met verschillende projectleiders en met de directeur van een van de bedrijven (Purefresh).

De resultaten van dit veldonderzoek hebben geleid tot veel nieuwe inzichten en een eindontwerp van een waterpunt (tap 21) dat geplaatst dient te worden bij scholen in Oost Afrika. De belangrijkste reden hiervoor is om kinderen gewend te laten raken aan een nieuwe gewoonte, het drinken van schoon gezond water. Om het vertrouwen van de lokale bevolking te krijgen dient het waterpunt een luxe uitstraling te hebben en dient er een krachtig merk te ontstaan. Om dit krachtige merk te creëren zijn er standaard kenmerken voor het waterpunt ontworpen die zorgen voor herkenbaarheid en betrouwbaarheid.

Voor de toekomst is het belangrijk dat er een test punt van de tap 21 in het veld komt te staan om te onderzoeken hoe dit ontwerp geperfectioneerd kan worden.

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# Summary

The client Susteq is a Social Enterprise that focusses on the development of prepaid water systems for developing countries. Susteq believes that everyone has the right to reliable, clean and healthy drinking water. To achieve this goal, Susteq places sustainable water points in combination with local NGO's (non-governmental organization). At the moment their main focus is on placing systems in East Africa, approximately Kenya and Tanzania. The water availabilities in these countries is very unreliable and the water quality and level of contamination differs a lot.

To actually supply every inhabitant of affordable and safe drinkwater, Susteq started with the development of Tap 21. Tap 21 is a tap point that combines the payment system with the proper purification system. This Bachelor Assignment is a part of this development. The assignment will be focused on the user interaction with the system and on the optimization of the design according to the wishes and needs of the local citizens.

The assignment started with a research to the users, the environment and the already available water purification systems. To acquire the best understandings of the users, their behaviour and the environment interviews took place with local NGO's. These analysis resulted in three different idea directions that have been researched in the field. The first direction is Education, the second is Marketing related, and the last one is focussed on a luxury appearance.

Subsequently, a research plan has been made. The research is aimed to test the functionality of the three idea directions. The research has been done at four different already existing water projects. First observations of these locations and the water points have been done. Afterwards different interviews have been done with the users and shopowners. Furthermore meetings took place with different projectleaders and with the director of one of the companies (Purefresh).

The outcomes of this field research resulted in a lot of new understandings and finally in a design for a water point (tap 21) which will be placed together with schools in East Africa. The main reason for placing the water points at schools is to let the children get used to a new habit, drinking clean healthy water. The waterpoint should have a luxury appearance and a powerful brand is required to gain the trust of the local citizens. Style items have been designed for the waterpoint to create this powerful brand. These items will provide the water point with recognition and reliability for the user.

In the future it is important that a test point of this design will be placed in the field to discover how this design can be improved.

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# 01

# INTRO- DUCTION

- 1.1 Susteq
- 1.2 Current situation
- 1.3 Problem explanation
- 1.4 Stakeholders



# 1.1

## Susteq

The client for this assignment is the Dutch company Susteq. Susteq is an Social Enterprise that focusses on the development of Prepaid Water System for developing countries. Their system is already placed at 17 water points in Kenya. At the moment 25 new Susteq sustems are being placed in Tanzania. And hopefully within two years 800 new systems will be placed in Nairobi (Kenya).

Susteq believes that everyone has the right to reliable, clean and healthy drinking water. The company helps national organizations with installation of Prepaid Water Systems in rural and urban communities. Because the inhabitants pay a small amount for the access of water, their water points can be maintained in a sustainable way.

The locals themselves will be responsible for the maintenance of the water points after they have been trained by Susteq. End-users buy an RFID-tag to gain water access via micropayments.



Image 1



Image 2

# 1.2

## Current situation

As stated by the World Health Organization (2004), access to safe drinking-water is essential to health, a basic human right and a component of effective policy for health protection. Yet, for several decades, about a billion people in developing countries have not had a safe and sustainable water supply. (Hunter, MacDonald, & Carter, Nov 2015) According to World Bank (2016) about 1.6 billion people—almost a quarter of humanity—live in countries with physical water scarcity, and in just two decades this number may double. Diseases related to contamination of drinking-water constitute of a major burden on human health. (World Health Organization, 2004) Even though there are different treatments known to clean the water, the surface waters which are heavily contaminated with organic matter and micro-organisms are commonly used as drinking water sources in resource-poor settings.

In some of these developing countries the availabilities of water can be very different. For example in some regions there is plenty of water, but the main problem is that the water is mostly contaminated. In other regions the problem is that there is almost no water available in the dry seasons. In the dry season the water becomes scarce and therefore very expensive.

In Kenya and Tanzania it is possible to get a water-connection in your home, but here the problem is that the watersupply is not reliable. In the dry season the connection can be unoccupied for many weeks in a row. Furthermore there are a lot of waterpoints that are not functioning well because the maintenance has not been done. Almost 25 percent of all the water points in Kenya is broken.

At the moment Susteq works in cooperation with partner organisations in Kenya and Tanzania to place their Water Payment System together with a water point. The partner organisation has the task to focuss on the communities and to do the field research before the system is placed. Susteq delivers the product and takes care of installing the system correctly. Unfortunately the field researches which has been done by their partners are not always reliable, therefore Susteq already experienced that in some locations the water points are not function well. In these situations inhabitants return to their old habits. For example in Malaba (Kenya) where the people now drink water from a river again.

The water points where Susteq already implemented their Water Payment System mostly do not contain a purifying system. It depends on the location and the situation but at some of these water points the water is still not of the quality that Susteq would like to supply and diseases like Cholera, Diarrhea, Hepatitis and Typhes can be spread through unclean water. (<http://www.lenntech.nl/processen/desinfectie/diseases/watergedragen-ziektes.htm>)

# 1.3

## Problem explanation

Susteq's mission is to supply as many people as possible with sustainable and reliable water solutions. To get more influence on the circumstances in which the Water Payment Systems will be placed and also to supply safe and clean drinking water in these countries, Susteq wants to develop its own system for purifying water points and place it together with their own ambassadors in Kenya. Therefore the company Susteq asked me to do this assignment, to design a purifying water point. This water point should have a Susteq payment system, an integrated water purifying system and should attract users to drink this clean water.

In the design of this system the main critical point is to make sure the people will use this product. Even though the health risks of contaminated water are known by the locals, they still tend to use the free contaminated water instead of the cleaned water which they have to pay a little amount for.

So in this assignment the main focus will be on how to pursue the users to use this clean and healthy water for drinking and food preparation. If you develop a water system but people will not use it, it has no effort for anybody.

To achieve this goal, first a research will be done to already existing water points and projects, the environment and the main users. After this research I will design three concept ideas that might help to pursue the users. These concept ideas will be tested in the field in Kenya and together with the results of these tests a final design for a water point will be created.

In this paper the purifying system will not be elaborated because the circumstances will be very different per location. The kind of purification that is needed depends on the available water per location. A partner organisation of Susteq, Akvoregia, has planned to develop and deliver the necessary purifying systems.

# 1.4

## Stakeholders

### Customers

The customers will be the centre in the design of the water point. They will be the user of the product and therefore it is important that the product will fit to all their needs. In this project it is important that the customers will really use the product even though it makes them pay for their water. The main question is how to convince these users to use this water in their households for drinking and food preparation.

### Shophub owner

To use the water points with an integrated payment system from Susteq the customers have to go to a special shophub. They can transfer money to an RFID tag at this shophub and with this money they can take water from the water point. Therefore the shophub owner is the first interaction of persons with the product/system which makes him/her very important.

### NGO's

Susteq works together with different non governmental organizations (NGO's) that are located in Kenya and Tanzania. For example they work with ICS, an innovative development organization with a pragmatic approach. They promote the sustainable economic development and wellbeing of farming families in developing countries. In cooperation with ICS Susteq placed a couple of systems in Kenya, and will place a 25 new systems in Tanzania this year. In image 3 you can see one of the already existing water points. This water point has been placed also in cooperation with another NGO, Maji Milele.

Maji Milele is the first subsidiary company of Water Forever. They are based in Nairobi, Kenya, but they aim to provide their services all over Kenya. Their mission is safe water for all Kenyan people and not only for a few years, but 'forever', meaning 'Maji Milele'.



Image 3

### Akvoregia

Akvoregia is a company that develops purifying products to optimize the quality of water. They focus on the development of systems for the following two purifying methods: the Ultrafiltration technology and the Ion exchange technology. Ultrafiltration is a water treatment technology based on membrane filtration, where a fluid (in many cases water) is pressurized through a semi-permeable membrane made from a synthetic polymer. The benefits for ultrafiltration lies in the fact that the technique uses less energy consumption, removes suspended solids, bacteria, viruses and pathogens without removing the necessary minerals. However if the water contains for example fluoride a different method, reverse osmosis is needed.

Susteq and Akvoregia are partners and are together working on the water purifying system. Akvoregia will deliver the cleaning system. Susteq will deliver the Susteq payment system. Together they design and develop the part that connects these systems.

# 02

# ANALYSIS

- 2.1 Market analysis
- 2.2 Environmental analysis
- 2.3 User analysis
- 2.4 NGO Research



# 2.1

## Market analysis

The market analysis is divided into two different parts. At first some very original and diverse water purify systems will be explored. And in the second part systems that are more similar to the future “Tap 21” will be explored.

### Water purify systems

#### The Ceramic Water Purifier

Household-scale ceramic filtration technology is considered among the most promising options for treating drinking water at the household level in developing countries. The filters were associated with an estimated 46% reduction in diarrhea in filter users versus non users, placing them among the most effective water quality interventions at the household level. (VERWIJZEN NAAR onderzoeks bestand over cambodia water system) The system can be found in image 4

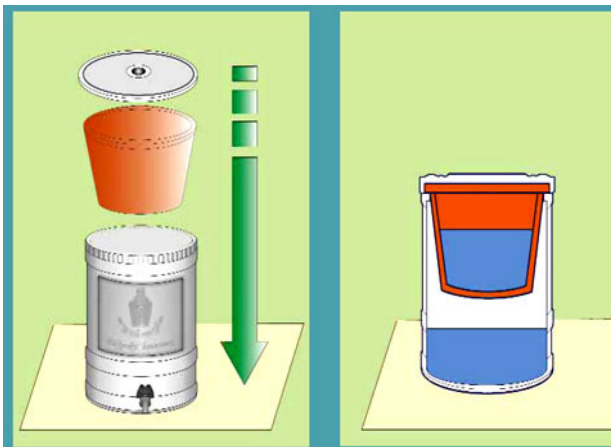


Image 4



Image 5

#### Lifestraw (image 5)

The Lifestraw is a small cigar-shaped tube packed with some truly innovative engineering. This clever design purifies water from potential pathogens like typhoid, cholera, dysentery and diarrhea – all before they reach your lips. The Lifestraw is an inexpensive way to deliver potable water to those in need, and it is considered an icon of humanitarian product design – it was included in Cooper Hewitt’s Design for the Other 90% exhibition, which featured products, architecture, and technology that’s have a positive impact on under-privileged demographics around the world.

#### Life Sack (image 6)

Jung Uk Park, Myeong Hoon Lee, and Dae Youl Lee are the industrial designers behind the water purification device known as the Life Sack. Not only does this product purify water, it also can be

used as a container for shipping grains and other food products. Once the package of food has been received, it can be used as a solar water purification kit. To filter contaminated water the Life sack uses SODIS (Solar Water Disinfection Process) technology: UV-A-radiation and the bag's thermal treatment process works together to kill deadly micro-organisms and bacteria in water. The sack can also be worn as a backpack for quick and easy movement from the water source to the community.



Image 6



Image 7

## Similar purify systems

### Aqua etiam

Aqua-etiam is a company from the stokvis group. It designed an unrivaled and patented purification nano-filtration membrane system. The filtration and purification solutions remove the harmful substances found in tap water, wells, rivers, etc. while retaining the precious minerals in the water. The designed solution is used in four different sectors. Those sectors are:

- home
- health care
- hotels, restaurants and catering companies
- agriculture and the food industry

Because the use of the designed solution in these sectors are so different, Aqua-etiam developed two different solutions. The purifying system is the same in both of these solutions, but the size of the solutions is very different. The small system is able to purify about 50 to 100 litres water per hour. And the big system is able to purify about 1.500 to 15.000 litres water per hour. Aqua-etiam is already a partner of Susteq. Together they have placed an Aqua-etiam purifier and a Susteq payment system have been placed in Kenya this summer and probably more systems will follow. One of the Aqua Etiam systems can be found in image 7.

### Solar Water Purification System from Sunlabob

The Solar Water Purification System enables pumping, purification and disinfection, and has huge potential of carbon emissions reduction by avoiding boiling water with firewood or charcoal. The



target groups are poor households living in off-grid areas with severe health, water and sanitation problems. The system also aims to create local entrepreneurship and enhance local communities' ownership on a development project, within a public-private partnership initiative.

The solar water purification system has two main components:

- Removal of chemical contaminants (colour, taste, odour, etc.) by use of several filters;
- Removal of microbial contaminants (such as micro-organisms carrying cholera, typhoid, etc.) by UV (and ozone) disinfection (flow sterilization);

Additional filters can be added depending on the quality of the raw water source (i.e. arsenic or nitrate filters, as well as additional fine filters).

It is powered by solar energy, and includes a battery for those days which are cloudy, so purification of the water can happen all year round, hassle-free.

### Sarvajal India water ATM

Piramal Sarvajal is a mission driven social enterprise which designs and displays innovative solutions for creating affordable access to safe drinking water in underserved areas. The mission of Sarvajal is to innovate, demonstrate, enable and promote sustainable water solutions for the underserved. Piramal Sarvajal sets up community level solutions that are locally operated but centrally managed on a market base, which means to pay per used system.

Sarvajal places water ATM's that are automated water dispensing units, which provide communities with 24/7 safe water access. They are solar powered and cloud connected, thus enabling remote tracking of the water quality and of each pay per use transaction. The ATMs will be refilled with water that is purified at a different location.

### Pure Unit

A project group from the University of Applied Sciences Saxion in Enschede (the Netherlands) has been working on a purifying water system the last 5 months which they called the Pure Unit. They focused on the technical design of a purifying system with a membrane and an automatic backflush system. The final design has been made in to a working prototype. They used ultra filtration to clean the water from bacteria and viruses.

This unit is meant as a technical part of a water purifying system, that can be placed together with any tap. For example with a tappoint from Join the Pipe, or together with the Susteq system.

### Purefresh

In Naivasha (Kenya) a business company has started to supply the citizens of this town with clean drinking water 6 years ago. At the moment this company, Purefresh, has 11 shops through Naivasha to supply the inhabitants with water. There is one location where the water is filtered, and from there the water is supplied to the different shops. At the moment you can buy the water in sealed bottles or refill your own bottles, but at the end of this year it will no longer be possible to buy sealed bottles. The company plans to expand even more, and wants to start delivering to schools in the neighbourhood.

# 2.2

## Environmental analysis

The water point will be placed in different areas around the world. The main focus will be at rural/suburb areas in eastern Africa, especially Kenya and Tanzania. The reason for the choice of these countries is that Susteq already has projects running in Kenya and will soon have projects running in Tanzania as well. Susteq expects that there are still a lot of options and needs for them in these countries. Because they already work in these areas they have good contacts there, which makes it easier to implement new water points.

### The Climate

Tanzania and Kenya lie on the east coast of Africa. The climate across Kenya and Tanzania is very different per location. Most of Tanzania is tropical and coastal areas are hot and humid, while the north-western highlands are cool and temperate. There are two rainy seasons; the short rainy period is generally from October to December, while the long rainy period last from March to June. The central plateau tends to be dry and arid throughout the year. (Rowhani, Lindermann, Lobell, & Ramankutty, 2011)

Across the country Kenya, the hottest months of the year are from December to March. The coastal areas are tropical, with particularly high humidity in April and May, but tempered by monsoon winds. The lowlands are hot, but mainly dry, while the highlands are more temperate with four seasons. Nairobi has a very pleasant climate throughout the year due to its altitude. Near Lake Victoria, the temperatures are much higher and rainfall can be heavy in the rain season. (Mango, Melesse, McClain, Gann & Setegen, 2010)

### Energy supply

Almost everywhere in Kenya and Tanzania you can get connected to the grid, but this grid is not very reliable. Often the energy supply fails. Most of the time the connection is recovered within a couple of minutes, but sometimes inhabitants have no energy for hours.

### Water availability

Like many poor nations around the world, Tanzania and Kenya suffer with serious problems to supply clean drinking water to its inhabitants. The ground water is the major source of water for the people, however this water is not always clean. The ground water can be found in wells. Many of these ground water wells are located near or next to toxic drainage systems, which leak into the fresh ground water and contaminate it. Consequently, inhabitants want to avoid this contaminated water and will turn to surface water. This water is not clean either, it can contain for example bac-

teria and human waste. Unfortunately people have no choice but to drink from it, bathe in or wash their clothes in these areas. According to the Tanzania National Website, water-borne illnesses, such as Malaria and Cholera, “account for over half of the diseases affecting the population,” because people don’t have access to sanitary options.

Diseases stemming from contaminated water aren’t the only problem plaguing the society. In a household where money is scarce and women (mothers and daughters) have to spend several hours each day walking to get water from pumps, they are at risk of being attacked or raped. TGNP, Tanzanian Gender Networking Program, has researched in a study of poor households “that the lack of safe, sufficient, and affordable water in Tanzania had increased rates of gender-based violence and the number of girls dropping out of school.” Families who don’t have money for water, let alone school, have no choice but to send their daughters out to collect water, possibly resulting in these episodes of violence. Unfortunately, the choices of these families are limited, they need water to survive. (Mbilinyi & Shechambo, 2009)

To solve this problem themselves, people started working as water carriers. They fetch water from a water source further away and sell it to the inhabitants. This water is very expensive and the source of the water is very often unclear. Therefore it makes the use of this water unsafe. In the images below you can see such a water carriers and an example of where they fetch the water.

According to Maarten de Wit and Jacek Stankiewicz (2006) across Africa, perennial drainage density as a function of mean annual rainfall defines three regimes separated by threshold values of precipitation. A 10% decrease in precipitation in regions on the upper regime boundary (1000 millimeters per year) would reduce drainage by 17%, whereas in regions receiving 500 millimeters per year, such a drop would cut 50% of surface drainage. By using predicted precipitation changes, we calculate that a decrease in perennial drainage will significantly affect present surface water access across 25% of Africa by the end of this century.



Image 8



Image 9

## 2.3

# User analysis

### Religion and language

About 40-45% of Tanzania's population is Christian and about 35-40% are Muslim (most of them live along the coast and on Zanzibar and the other islands). A small number follow traditional religions and there are some Asian communities including Sikhs and Hindus. About 80% of Kenya's population is Christian and the majority of people living along the coast are Muslim. A small number follow traditional religions and there are some Sikhs and Hindus. In Tanzania and Kenya different languages are spoken. The official languages are Kiswahili and English, but there are over 158 ethnic languages spoken in these countries.

### Habits

A survey from New Business Challenge (2015) (Appendix A.2) shows some really interesting information about the habit of the water usage of inhabitants in Ghana. For example it states that the importance of clean water is obvious to all people, but only a few low-income consumers have access to safe drinking water consistently. Next to the availability of the water there are more reasons why inhabitants still keep on using unsafe drinking water. For example, it is cheaper and sometimes it is easier to reach. Furthermore they wonder if it is really that bad for their health. They have been drinking this water for generations, and are not sick that often right?

The survey also shows that people trust and value strong brands. This habit originated, because of the highly unsure market in which many people encounter fake products and scams. Therefore the amount of contact points with the product is very important for the people to trust the product and the brand. If they encounter it in multiple locations, this will increase their trust in the product. They also state that it is a habit that mostly women purchase the water for the whole household.

A normal East African family is very big compared to European families. The average amount of children of the families in Kenya are 8 children. (Buchmann, 2000). Assumed is that every family member needs around 2 litres of clean drinking water each day for drinking and food preparation. In total a family of 10 persons will need 20 litre of clean drinking water a day.



## Scenario's

### Meet Mercy

Mercy is a 12 year old girl. She lives together with her mother, her father, her grandmother, her five brothers and three sisters. Every morning she walks together with her oldest sister to a water point in the next town, which takes them about three hours in total. They fetch 40 litres of water and they carry this on their heads. (image 10) The school starts at 9 o' clock, so she does not go to school anymore, because it is not possible to combine this with fetching the water. Instead she helps her mother in the household.

Mercy hopes that she can go back to school one day and learn just as much as her brothers and younger sister. She wants to become a nurse and work in a hospital!



Image 10

### Meet John (image 11)

John is an 17 year old boy. He lives together with his mother and 7 siblings. Almost every day he works in the family shop in Amagoro. They have a printshop, but they also sell souvenirs, writing materials, sun-glasses, etc, and water credits and tags. He likes working in the shop and being in contact with his fellow residents.

A new system has been implemented about a year ago to improve the water availability in Amagoro. He is really excited about the system and he feels good about helping the rest of the village out and they can even make money with it. Sadly enough his mother does not want to help him. All the tags are finished and he has almost no credits left to sell. Every week a very interesting girl, Maria, visits the shop to buy water credits. Hopefully his mother has charged the credits before her visit this week! He is thinking about saving money himself, so he is able to buy some new credits.



Image 11

# 2.2

## NGO research

To acquire a better understanding of the field in which the product will be placed an extra research has been done. Susteq places their payment system via partner organisations in Kenya and Tanzania. These partner organisations do the field research before a system is placed. They know the environment and their customers very well. Therefore interviews have been done with three different NGO's (non-governmental organizations) from Kenya and Tanzania. They have been approached for an interview. With two NGO's a interview took place over Skype, and one NGO preferred to answer the questionnaire by email. The NGO companies were ICS, MSABI and SWAP. Below summaries of the acquired information can be found. In Appendix A.1 the complete interviews can be found.

### ICS

ICS is a partner company of Susteq in Tanzania. ICS is an innovative development organization with a pragmatic approach. They promote the sustainable economic development and wellbeing of farming families in developing countries. In cooperation with ICS Susteq placed a couple of systems in Kenya, and will place a 25 new systems in Tanzania this year. They have 5 different offices in Kenya and Tanzania. They do not have any experience with a purifying system. They normally take water from rivers and lakes and put it in a tank, and from this tank it will be spread to different tap points. This water is not cleaned, only the big pieces of waste are filtered out. So there can still be viruses and bacteria in the water of which the people can get ill. In locations without a water system, people just take the water straight from the rivers. This water is mostly very dirty. Locals filter the water with a piece of fabric as you can see in image12.



Image 12



Image 13



ICS wants to use a purifying water system, but it obviously depends on a lot of different conditions if the use is really possible or not. It depends on the price, the design, and if there are any possible locations. ICS says that the locals in the area are aware of the consequences of drinking non-purified water. But even though they are aware, the locals do not always listen to the advices of ICS. ICS believes that more education can help them to be even more aware so they will listen to the advices.

From my question 9 and 10 I found out that it depends on the location if the locals are willing to pay for the water. The prices from the taps that ICS already has in the field are around 50 shilling per 20 litre. But sometimes a nearby water point is far away, for example in the next village, which means a 6 km walk. Because of the distance a water carrier gets a lot of water from this point with his bicycle and sells it for very high prices in the village again. Then the price can get up to 500-700 shilling per 20 litres. This does not even have to be purified water. (image 13). The interviewed person of ICS thinks that a price around 100 shilling for purified water will still be good to pay for the locals. This is still much cheaper than the water from the water carriers.

The interviewed person from ICS explained that the locals in Kenya are strongly attached to their habits. These habits can be different per location and per community, but within this community they are mostly the same. For example people are eating the same food every day, for lunch and for dinner, because they are used to it, and it always worked fine this way. The same habits exist in water usage. For example in some areas people are always boiling their water before they consume or use it. But at the same time in a different community people are used to drink the water directly from a river. They think that because their parents and grandparents did it this way, it should be safe. And they do not see the direct consequences of drinking this contaminated water.

### MSABI

MSABI is a company that started in 2009 in response to frequent cholera and typhoid outbreaks in the rural regions of Tanzania. The main goal of MSABI is to deliver water, wash products and services and most of all to improve people's lives. It is a big company with 70 employees that work in 5 districts in Tanzania.

The water pumps that they place do not contain a purification system, but they have experience with purifying ceramic pots. (see the Market analysis) They go to different communities to show the inhabitants how this system works. Furthermore they visit communities and schools to educate the people about the importance of clean water. This education and way of marketing helps partly. Unfortunately, most of the people do not understand the problem of dirty water, but they do not want to invest in the solutions.

It depends on the communities if they are used to pay for water or not. In communities where a donated free water option has been introduced, people are not willing to pay for water anymore. The water from the rope pumps that MSABI placed is free, partly



Image 14

because of subsidy (image 14) The ceramic pots cost 35000 TSH each and can be bought by the inhabitants. But this amount does not cover all the costs of the ceramic pots. The rest of the costs are paid from subsidies or donations.

### SWAP

SWAP is a registered NGO, founded in 2005 and operating in Western Kenya, with its headquarters in Kisumu. SWAP has an extensive distribution network of Community Health Promoters and HIV support group members who are engaged and trained to become Community Health Promoters, vending health and hygiene products and promoting health. They promote and sell these products to vulnerable communities in remote areas with limited access to health services. SWAP has a human resource base comprising of more than 50 employees, including administrative staff, research, field, training officers and a competent management team. They already do have experience with purifying water systems.

Only 40 % of the population has access to improved water supplies, others get their water from rivers, ponds or the lake. Because of the poor infrastructure in the remote and underserved areas, most people are not aware of the water treatment and do not have access to it. However in and around the major market places and towns there is an increased awareness and people can procure these items from the local shop or from NGO's. There have been yearly outbreaks of cholera and the Ministry of Health has increased their effort to do health campaigns on improved water and sanitation.

24

The message SWAP wants to deliver to the inhabitants is that the water from the tap is not safe. The pipes which lead to the tap are often broken and vandalized. SWAP has a water lab and they often test water from the tap and in the outcome of those tests they often find traces of Ecoli and coli-form, this means bacterial contamination. The message is to always treat the water. SWAP works with trained community health promoters who do door to door health promotion and sales of water treatment and water filters as well as hand washing soaps. They are trained on social marketing and behavioral change and are given household targets. Through this approach they reach remote and underserved areas who would otherwise have no access to health products and education.

SWAP says that they have seen the health impact on the communities from this approach. Diarrhea is reduced and the community health promoters have an economic empowerment, they make an income while selling these products and also adopt healthier practices themselves. There is increased awareness due to also joined efforts of different NGO's and the Ministry of Health. This is also because the area has been prone to flood and cholera.

The people that are connected to a water connection are getting billed for their use. There are water vendors who sell to the community at a rate of Kes 5. This may not be safe water and also the jerry cans which are used, are not always clean. Others sell clean water like SWAP and the community pays the same Kes 5 for 20 litres. SWAP still advises to treat the water because of the storage. They may not store it in a safe way and the water can get contaminated. Others who cannot afford to pay, will take water direct from the nearest source, lake, pond, river or harvest rain water.

SWAP sells Waterguard, Aquatab, Purifier and a ceramic water filter. In the supermarkets there are various water treatment purifiers and filters available.



# 03

## DESIGN PROCESS

- 3.1 Design focus
- 3.2 Education
- 3.3 Marketing
- 3.4 Luxury

# 3.1

## Design focus

It is very important in the design of a purification system that it fits to the users. There are a lot of western technologies that people tried to implement in the East African lifestyles. Most of the times the implementation does not work well and different alterations have to be made. Even after these alterations often the system still does not fit to the East African users. Therefore I think that to make this purification system work, it is important that the system is designed for their main users and environment. The design focus must be mainly on the interaction between the users and the purification technology.

It is very important that the inhabitants will be attracted to use this system and especially its water. Because of the strong attachment to their habits it is a difficult, but critical point in the design of the purification system. Three different ideas on how to attract people are elaborated in this chapter. These different ideas have been tested in Kenya. The results of this research will eventually be used in a final idea about the attraction and in a final design.

## 3.2

# Education

The first concept is based on an educational view. Will it help to attract the users by making it possible for them to explore what happens with the water? Most people in Kenya and Tanzania are aware of the influences of contaminated water on their health, but they do not understand what actually happens with the water when it is purified. If you compare it to the habits of some of the locals to clean the water, they are for example used to cook the water before they drink it. They still do not know what happens with the water when you cook it. Does it make a difference if they do know and understand what happens?

Within this concept there are two ways of approaching the problem. The technical part can be shown to the users for example through a window. It might help to attract the inhabitants to the system and to convince them that this water is different compared to the water from a borehole or river.

One project in Naivasha (Kenya) already has a window that shows the technical part of the system to the locals. At this location users will be interviewed to get to know the influence of the possibility to see the purification on their usage of the water point. A picture of this window example can be seen below. (image 15)

The second way of approaching the problem is focused on the teaching part. Will the locals be more aware and change their behaviour if you teach them what happens with the water? To find the answer to this question it is first important to know what is already known by the citizens. Is there a difference in this knowledge in the various communities?



Image 15

## 3.3

# Marketing

The second concept idea is based on a marketing view. The main question here is : Can you change the buying behaviour of inhabitants with the way you present the water to them? For example, how will the locals act if you sell cheap drinking water next to even cheaper cleaning/washing water? A design for such a water point can be found on image 16. The symbols above the tap points show the difference in the water.

Will the inhabitants behave as expected and buy a small amount of the drinking water and a big amount of washing/cleaning water? Or will they only buy the cheapest water and use that for drinking as well?

Furthermore it is interesting to look at the way the marketing is done for existing water points. At these points it is interesting to find out what works and what does not work. Questions that can be asked are: How is the water point promoted? How do people react on this? How do people look at the water? Etc.

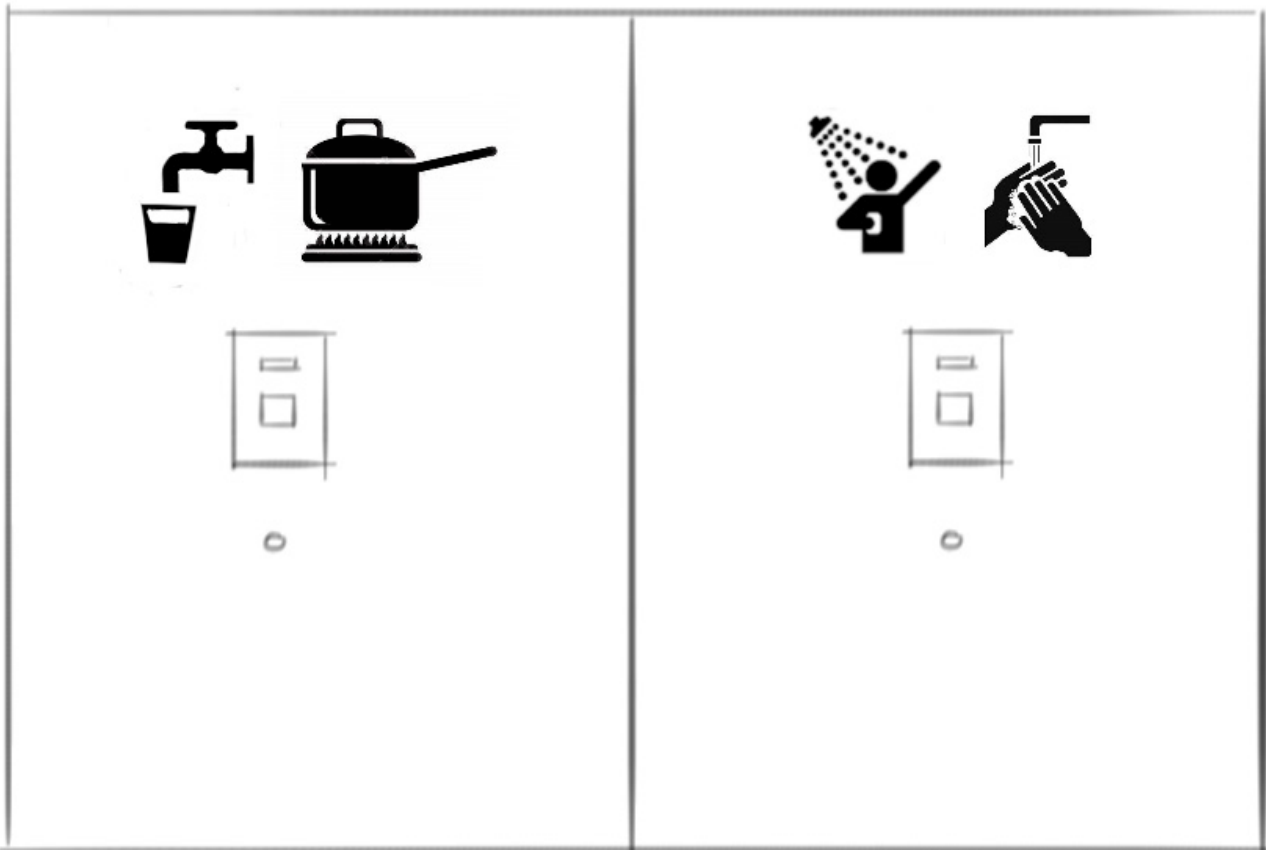


Image 16

## 3.4

# Luxury

The third concept is focussed on a luxurious appearance. Bottled water has a luxurious appearance. People trust that the bottled water is clean and healthy, but is this correct? Some water points in Kenya clean borehole water and fill and seal the bottles with this water themselves. The same water could also be distributed at different taps. Therefore it is interesting to know the answer to the question: What makes people trust this bottled water? And can we use these results in the design of the water point to make the users trust this water just as much?

Furthermore the bottled water looks more luxurious compared to carrying water in a jerrycan. So it feels special if you are able to buy this water. Do people care about the appearance they make on their neighbours with the water they buy? And therefore does it make any difference in the behaviour of these users? In the images below you can see an example of a bottle (image 17) and an example of a jerry can (image 18) that are used in East Africa.



Image 17



Image 18

# 04

## FIELD RE- SEARCH

- 4.1 Research plan
- 4.2 Results
- 4.3 Conclusion

# 4.1

## Research plan

The 14th of August I went to Kenya to gain new and better insights in the usage of drinking water and to find the best way to implement a purifying system. The ideas that are elaborated in the previous chapter have been researched in the field and have been presented to locals to gain their thoughts about it. In Appendix B.1 an overview of all of the activities in Kenya can be found and in Appendix B.2 a travel diary from this trip can be found.

To investigate the different ideas that are explained in chapter 3, four different projects have been visited. For the educational idea the water point in Naivasha from Sunny River is investigated. At this water point the customers can see the technical part of the purification system through a window.

The marketing point of view has been researched at the project in Amagoro and Malaba. At this location there are a lot of water points. All these water points have the same design and together these water points form one project. They have different users of which some have been interviewed. The project is not functioning well, and during my trip I tried to determine the reasons why.

The luxury idea is mostly researched in Naivasha as well, but at the other project in this town. A company, Purefresh, has a good functioning clean drinking water project in this city. At this project the difference between the usage of water bottles and jerrycans can be investigated. The main appearance of the water point in Oyugis (from the company Pi Kachuku) has been compared to the water points from Purefresh.

At all the different projects that have been visited, observations were made of the water points and the shops. Pictures were taken according to a list of questions that had to be answered. (Appendix C.1) A list has been made with standard questions for all the locations separated on shopkeepers and users. Furthermore some specific questions per location were prepared. (Appendix C.2)



# 4.2

## Results

During the trip to Kenya some interesting points have been discovered. The general discoveries will be elaborated below and afterwards the results of the three different ideas of chapter 3 will be explained.

### General discoveries

The usage of the waterhub is very clear for all the users. Only the three tappoint system is a bit difficult for new users. But after a short explanation about the functioning of this system or about trying it one time, they understand it already.

All the water points in Amagoro and Malaba contain chlorine dispensers so people can add a drop of chlorine to their fetched water to keep it clean. Even though most of the users that I asked about the chlorine told me that they use it a lot, it turns out that the chlorine dispensers are almost not being used.

In Malaba I also visited an alternative water point, meaning the river, for the inhabitants if the water point does not work. I met four children that were playing nearby the river. One girl jumped in the water to play and also drank the water straight from the river. When I asked them about it they told me that they normally use this water at their homes as well and that they thought it was safe to drink it. (image 19)



Image 19



All the shopowners that I spoke, told me that they never had any problem with using the shopsystem. One of them told me though that the only thing that is difficult is that some amounts of credits take a long time to be transferred to the users tag, because they have to divide the amount in smaller steps. For example, to transfer 80 KES, they have to divide it in four smaller steps. First 50 KES, then 20 KES, and at last two times 5 KES.

Furthermore in Oyugis and Naivasha I discovered that the taste of the water is crucial. The questioned people think that good tasting water is a direct relation with clean and safe drinking water. The system in Oyugis for example now has a

### Educational

In Naivasha there is a project from the company Sunny River. At this location they purify water that is tapped from a borehole. This water is sold in small amounts in bottles, and in big amounts (respectively in 10 and 18,9 litres) the bottles can also be refilled. This location contains a window that shows the technical parts of the purification. According to the shopkeepers a lot of people are interested in what is happening behind the window. Almost every day there are people who want to know more about the purification part of the system. These people are often showed around in the technical room.

Furthermore most of the users also said that they are interested in the purification system. They are curious to see what happens behind the window. But it does not convince them to buy the water at this location. The users that I interviewed told me that they have no problem with trusting the quality of the water they can buy in this location. Because the bottled water you can buy at this location is sealed, it feels already safe for them. If the window with the purification part of the system was not there, they would not even have noticed that the purification takes place at this same location.

On the contrary a women told me that she thinks that because of the window it helps her to convince her of the quality of the water. If the water runs from a pipe like any other water point, it does not look more special than the other water and she would not trust it. Furthermore almost all of the questioned people told me that they would prefer to buy a bottle of water in stead of water from a tap, even though it is the same water.

### Marketing

For the second idea users in Amagoro/Malaba have been questioned. They were asked about what they would do if they had the option between the purified drinking water and the washing/cleaning water. From the 10 questioned users in Amagoro one user said that she would buy the drinking water and that she would fetch the cleaning water somewhere else. For example in the river closeby, but only if there is enough water.

In Oyugis only one women and her family were questioned. The women explained that she did not believe this concept with two different qualities of water will work. She thinks that most people will only use the cheapest option. Once you tap the water it looks clean, so people will believe that this water is safe. And they will use it for drinking and cleaning both.

From the 10 questioned users in Amagoro 2 users said that they would buy the drinking water and that they would fetch the cleaning water in the river close by. 5 users said that they would only use

the cleaning water, and that they would drink that as well. The other 3 users said that they would use both of the tap points, for drinking and cleaning/washing.

### Luxury

The appearance of the water shop is very important. I noticed that if it looks good, people associate this with the quality of the water. In Naivasha the different shops from the company Purefresh were all focused on the appearance they have. In image 18 and image 19 you can see two different shops from the same company. In the shop in image 18 only water related products are sold. It is possible to buy bottled water in different amounts, or to refill your own bottles and jerry cans. The other shop (image 19) was already used for selling milk, and a water ATM has been placed here. There are some similarities in the design of both shops, but they could also be of two different brands, because the design is not that corresponding.



Image 20



Image 21

The difference between the water taps in these two shops is also very big. The refill system in the water shop (image 20) looks very professional and has an expensive appearance. The appearance of the water ATM (image 21) is imitated from an already existing milk ATM and looks a bit more amateurish. But in comparison with the interface of the water point in Oyugis (image 22) both of the systems in Naivasha look very professional. If I would have to choose myself between the two systems, it would be from the refill system in the water shop in Naivasha.

The refill system in the water shop has a very high tap, this does not only look very nice, it is also practical. Almost all the different bottles and jerry cans that are available in East Africa fit under-



Image 22



Image 23



Image 24

neath. The users do not have to touch the tap with their hands at any time in the dispense process. Therefore the water tap and its water will not be contaminated. In the water ATM the idea is the same, you do not have to touch the tap to dispense the water. But at this location the disadvantage is that it is not possible to use all the available bottles and jerry cans because of the limited space in the ATM. The water point in Oyugis does not contain a luxurious tap, but a plastic tube should be placed inside the jerry can/bottle to fill it. Therefore the users, the jerry cans and the water will touch the tube. If one of these is contaminated, the whole waterpoint will not be safe to use any-more.

Futhermore the users of all these different systems where very pleased with the functioning and the appearance. In Oyugis they have never seen any of the systems in Naivasha, and are therefore their system is already a luxury. But they agreed that the system does not appear to be very luxurious. All of the users I spoke to in Naivasha told me that they trust the water that they buy to be safe. In Oyugis there were not a lot of customers yet, but the one family that uses the system now also trusts the water from the system. But it is very difficult to measure the differnce between the trust of the users at these two locations because there ar not a lot of users yet in Oyugis. The users did tell me that they expect more from the water when a tap point looks more luxurious. The big critical point in this trust is the reliability. If one of the water system fails once in a while, the people can not depend on it.

### Schools

Furthermore I also visited some schools in Homa Bay county. These visits were not planned, but turned out to be very interesting. The schools in Homa Bay suffer with issues for supplying their students with clean drinking water in the dry season. The water network fails sometimes for months in a row and their boreholes are dried up or contaminated (image 23) and therefore they have to buy water from water carriers. The source of this water is most often unclear and unreliable.

52



Image 25



Image 26

The location of a shophub and the commitment of its owners are crucial in the success of the waterpoint. Without reliable shops the water point can never become a big success. In Amagoro there are problems with the commitment of the shopkeepers, therefore users often come to the shop for credits when there is none available. For the shopkeepers need to invest in the tags and the credits before they can sell them and earn something as well. This is a big step for most of the shopkeepers, and therefore they postpone on doing it. It turns out that to solve this problems, the combination of a water point and a school works very well. The shop is placed next to the water points and therefore there is a direct contact point during the day. Furthermore the school has the responsibility for the shop and does the investments. In Nairobi there are two Susteq systems placed at a school. (image 26) This location functions very well, and it is used a lot by the surrounding community.



# 4.3

## Conclusion

The research and my experiences in Kenya gave some interesting new points of view. Overall the usage of the Susteq system is very easy, and understood quickly by the users. There are some small improvements that could be made according to the three-tap system and the shop hub, but they are not really needed.

The following requirements for the design of the water point resulted from the research. The first requirement is related to the reliability of the system. It is important that the water point delivers clean drinking water the whole year trough, and it should never be broken or dried up. To get the non functioning hours of the system as low as possible it should be known by the supervisor of the water point within 24 hours when the system is broken.

The second requirement is related to the usability of the system. A customer should be able to use the system and tap 20 litres of water within 2 minutes. It is important that the interaction with the system is very easy and logical. Another important requirement is that the tags and credits should always be available in the shop during its opening hours.

A really critical point in the design is the appearance of the shop and the water point. This water point that supplies quality water should look more special than any other water point. People associate a good looking water point with good quality water. Furthermore a strong brand helps to convince the locals of the quality of the water. To develop a strong brand is very time consuming and needs to grow over the years. But to facilitate this growth it is critical that the different water points and shops have a matching appearance. The tap itself should also appear to be special and expensive, and it is important that it will not be contaminated by people or jerry cans touching it.

The visits to the different schools convinced me that these schools are a very good location to implement the water points and shops. It is important that the shop is located closely to the water point, and that the credits and tags are never finished at the shop. This could be solved by placing the waterpoint and shop at the school. Therefore the responsibility of the shop is not for the shopowner, but for the school. They have more money, it is easier for them to invest in new tags and credits.

# 05

## FINAL DESIGN

- 5.1 Location
- 5.2 Water refill point
- 5.3 Water dispenser
- 5.4 Shop

# 5.1

## Location

The purifying water point will be placed at schools. The changes in the habits of the locals are difficult to be made. They attach a high value on their habits and are not interested in changing them. Therefore it is important to start changing the habits of children. Children are more open for changes. By implementing the purified water in a school, the children will get used to a new habit, they will make it their own and they will take it back to their homes and families.

Furthermore, the shop for the credits will be placed next to the waterpoint. In contrast to already existing projects, a new shop will be placed instead of using an already existing shop. The shopowners do not have to buy the credits and tags themselves first, but the school will do that, and they will sell it for the school. During the opening hours of the shop a lot of feedback about the usage of the water point can be collected. For example, if something breaks it will be noticed by the shopkeeper or it will be told to the shopkeeper.

5.1

First the private schools will be introduced to this system. They have more money to invest in the system and have a high interest in having clean drinking water for their students. Therefore it will be more likely that they are interested in placing the system in their school. The system will on one hand supply the students with clean drinking water for free, and on the other hand it will sell clean drinking water to the community. The money that is collected from the community inhabitants will be used for the maintenance of the water point.

For the water supply to the students two different approaches are possible. During classes it is preferable that the students do not have to leave the classroom to get their water. Therefore small water tanks will be placed in the classrooms. (image 27) During breaks and for boarding schools during the evenings the students can use their own tag with which they can tap a maximum amount of free water each day. It depends on the school at what height this amount will be set.



Image 27

## 5.2

# Water refill point



Image 28

62

In the image above you can see the Water refill Point. It will be a combination between a water dispense system and a shop. The water point will have 2 sides of interaction. At the outside of the school ground there will be an interaction point for the community inhabitants, and on the inside of the school ground there will be an interaction point for the students. By seperating these two groups to different locations it is easier to supply the water for free to the students without the community members noticing and complaining about it.

For the school it is also a benifit that the customer from the community do not have to come to their ground for the water, but can buy it at the fence and that the students do not have to leave the school ground for their water. As you can see in image 29 on both sides of the fence there is an interface with the shop and the purification room.

The name WaziWater that is used in the banner is optional. A market research has to be done to find a suitable brand name with which the locals have good associations.

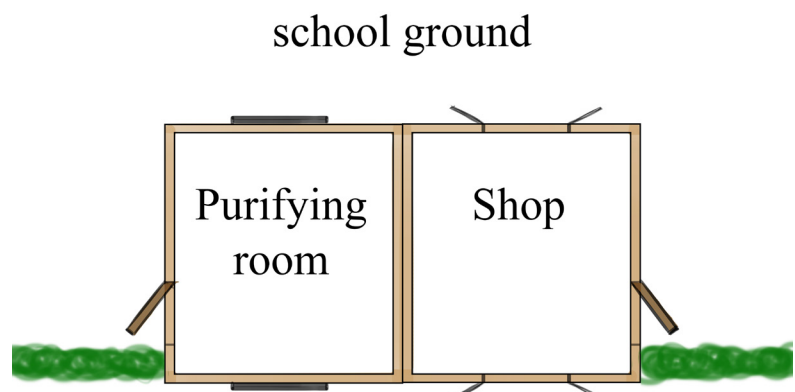


Image 29

## Style items

To create a powerful appearance, and strength within the brand and different water points, the following standard style items are implemented in the shop.

### 1. Banner

At every water point a similar banner will be placed to keep a consistent appearance. The banner is in a striking blue colour and it will stand out of the surrounding. The name WaziWater that has been used in the design of this banner is optional. A market research should investigate the associations of the locals with it before it is implemented in the field.



Image 30

### 2. Colour

The colours used in this waterpoints are as you can see in image 28. All the walls are painted in a very light blue colour. (#eff8ff) Furthermore a darker blue line is painted for uniformity. This is the done in the same colour as the banner. (#186fbb)

### 2. Logo's

Underneath the blue line the logo's of the different cooperation companies are placed. In the image above some examples of company logo's are placed. But they can be changed according to the different projects.



# 5.3

## Water dispenser

### Water dispenser

The water dispenser (image 31) is the main interface between the water and the customer. The dispenser is mainly made from aluminium. The Water Payment System is implemented in the complete front panel.

The dispenser has a box in which the jerrycan/bottle can be placed. A small perspex panel secures the tap point of contamination from people touching it. Because of the panel the users can see the tap and therefore know where to place their jerrycan/bottle. But they are not invited to touch the tap-point, and they do not need to touch it to place their jerrycan/bottle at the right place.

The hole in which the jerrycans/bottles can be placed is 470 mm high and 360 mm wide. All the available water bottles and jerrycans of 20 Litres or less will fit in the hole, without them needing to touch the tap itself.

As can be seen in image 30 the design is checked on the visibility of the screen and the tap point. It is important that the user can see the tap through the perspex panel. At this image, a woman of 1 meter 70 stands in front of the waterpoint. She can see the tap point through the perspex panel. Because the students from the schools will probably be smaller they should all be able to see the tap through the perspex panel. The dimensions of the complete water dispenser can be found in Appendix D.1

To perfect the usage of the customers extra information will be painted on the wall next to the system. An information paper has been made and can be found in Appendix D.2. According to comments from the users in Kenya this paper is designed. The choice for a combination between symbols and text has been made. Not all the users can read, and there are a lot of different languages that are being used. Therefore the combination is a good option. And all the users can understand either the symbols or the text.



Image 31

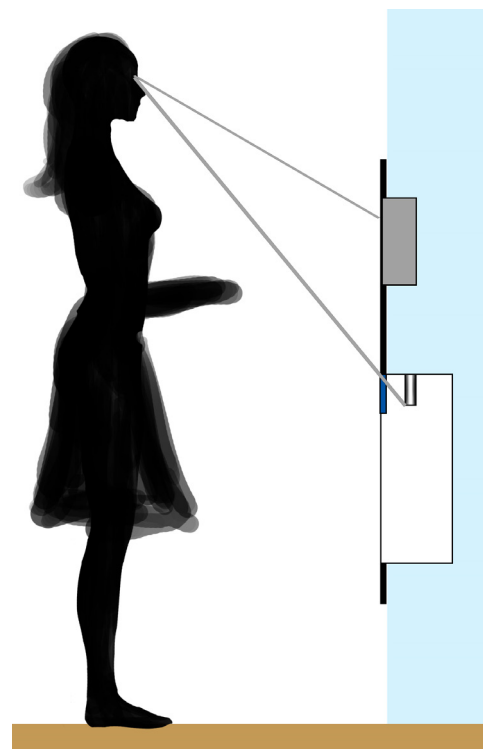


Image 32

# 5.4

## Shop

The shop is a small room with a window on both interaction sides of the water point, for the students on one side, and for the community members on the other side. In the centre of the shop on the wall a Susteq shop system will be placed. With this system the shopkeeper can transfer credits to the tag of the customers.

Next to the credits and tags the shop will also sell other water related products. Some examples of products that will be sold in this shops are :

- water bottles/jerry cans (in different sizes, intended to be refilled)
- products for cleaning the bottles/jerrycans
- water dispense products (such as image 33)

The shop will have a big window with an open view which is very inviting to its customers. But in the evening it is possible to close the shop with the blinds.

Every day during opening hours of the school the shop will be opened. During this time the tags and credits can be bought. But the water point can be used all the time, also during the night.



Image 33

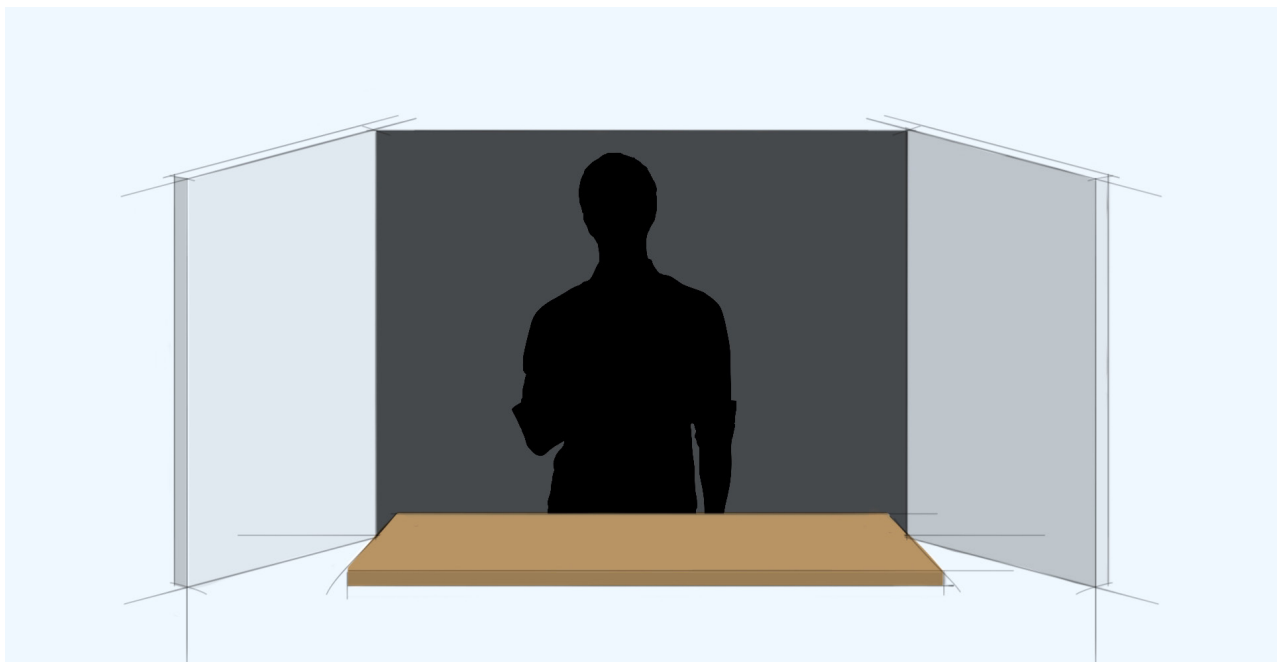


Image 34

# 06

## CONCLU- SION

6.1 Conclusion

6.2 Recommendations

# 6.1

## Conclusion

As elaborated in the problem explanation, the main critical point in this design of the Tap 21 is to make sure that the people will actually use this water point. It is not possible to say if the final design succeeds in this point, but the expectations are high.

The East African culture is focussed on habits which will not be changed easily. By placing the purifying system at a school, children will be introduced to clean drinking water. Now these children will get used to the habit of drinking clean and safe water and hopefully they will make it their own habit as well. At the moment already existing water project are running very well.

During this assignment the biggest challenge was to understand the users. Their habits, their thinking, their activities, etc, it is all different compared to the western world. But this also made the assignment so interesting. Often european citizens see that there is a problem in Africa, and they want to help. A lot of money is invested to place techniques, that are designed for the western world, in poor countries. Very often the successs of these kind of products is low, because the wishes of the locals have not been taken into account. So it is very nice to try and design something that is made for these wishes of the locals and it is also really appreciated if you really focus on their problem and try to understand it.

Sadly enough there are some regions in Kenya where at the moment, a purifying water system would not work, independent of the design. Some communities are not ready for such as sytem yet, but in the future the awareness in these locations might grow, and than a purifying system will hopefully succeed there as well.

During this trip and this assignment I sometimes realised that we are so lucky with the circumstances in the Netherlands. I think that it is good to sometimes stand still and realise how lucky we actually are, being able to live our life the way we do. Being able to go to school, to study for a job we really like, to say and do watherever we want and being able to eat and drink whatever we want, whenever we want it. Just being able to walk to the sink to put your head underneath it and drink. This is someting more special than most people realise.

Therefore I am also really thankfull for this assignment and with the possibilities that I got from Susteq. This assignment did not only help me to become a better designer, but also to find out more about the designer I want to become in the future and it thaught me some good life lessons. The company Susteq showed me that you sometimes just have to jump in the deep, and make the best out of it.

# 6.2

## Recommendations

The final design is still a bit rough and needs to be optimized. This could be done by first doing some quick prototyping and then placing a test system in the field. When a test system is placed in the field it is very important that the water supply is very reliable. Because the research showed that one of the main critical points to make a water project work is the reliability of the system. A lot of bad experiences with bad functioning water systems caused this difficulty in trust that the citizens have.

A brand name should be chosen wisely. In this case the name WaziWater was chosen but before implementing this name in the field it is important to know what the citizens associate to this word. A field research should be done to find the best brand name.

Furthermore it might be a good idea to develop the two interface sides even further according to their main users. The interface that is meant for students could be more customized for their main users, children. This could for example be done with the use of extra colours in the design. Of course this amount of customizing will depend of the age range of the school and might even needs to be done for all the different age ranges that exist at schools. This is the reason why it is not done in this design yet.

There has been a small comment from one of the users about the shop hub. It takes a very long time to add for example 80 Kes to a tag. It might be a good idea to see how this can be improved. Another idea is to develop a shop system that can exist without a shopowner that needs to interact with it. Then the system will be completely independent from employees which makes it possible to use the system 24 hours a day and no problems will occur with not-committed shopkeepers.



# 6.3

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### Web links

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