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Innovation Report Loop 1
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Rapport1

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Executive summary

The milk in Tanzania is generally of bad quality, this issue is an issue that Jengo is aware of and is currently searching for an implementable solution for their partnered Maasai people and cheese factory. Looking at the whole supply chain we found that the milk vessel which is used to contain the milk for transportation to the cheese factory is not cleaned properly and is, therefore, a contamination risk. Jengo is an NGO group that is 100% volunteer-run organization. Jengo's goal is to operate sustainable changes in Tanzania and is focused on the 17 sustainable development goals, such as gender equality and climate change. In this report, there is a proposed solution that would help Jengo solve the issues around hygiene in their partners' environments, by teaching the factory workers how to clean the milk vessels properly and setting up an exchange service, where the transporters would exchange milk-filled containers with a clean empty container. We then made a prototype of what a cleaning protocol for the factory workers would look like. Implementing this solution should result in more milk of a higher quality and could increase cheese sales to high rated- restaurants, -hotels, and -establishments and ensure proper compensation for the Maasai women's work and in this way increase their social status which is one of Jengo's goals.

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1 Introduction to the problem/ background

This report will provide solutions for the volunteer-based NGO Jengo to improve their project on milk production in Tanzania. Jengo has demanded solutions to their biggest problem, which is hygiene. The Maasai people produce the milk from their cows, the milk is then collected in containers, which are shipped by a private driver to the milk factory in Longido. This long process from cow to cheese can be very unhygienic which can cause the formation of bacteria. Tanzania is located in the tropical climate belt, the average temperature is 27-28 degrees, which is an optimal temperature for harmful bacteria. Harmful bacteria can be dangerous to health, at high temperatures the bacteria multiply, thereby increasing the risk of milk-borne diseases and loss of the quality of the milk.

In a laboratory Study of milk quality in Tanzania, a large number of bacteria have been found:

"Based on performed analyses, total bacterial count $1.0 \cdot 10^7$ *colony-forming units per milliliter (CFU/ml) and total coliform count* $1.1 \cdot 10^7$ *CFU/ml, also greater than recommended levels, were found. Ten bacteria types were isolated from milk samples (five, Pseudomonas aeruginosa, Listeria monocytogenes, Listeria innocua, Listeria ivanovii, and Klebsiella spp. are reported in Tanzanian for the first time). Two drugs tetracycline and sulphur were detected"*[1]

This shows that there is a major hygiene problem that must be solved to avoid diseases and deterioration of quality. The factory sells the cheese to the major cities around Longido, it is necessary to ensure quality.

2 Jengo

The problem is solved for Jengo, an NGO group that is 100% volunteer-runned organization. The organization was created after the chairman Lars Ulrik Nielsen visited Tanzania, who has a background as a Cand.Merc.IT. and primarily is working at Microsoft. Then there are the vice-chairman and 4 board members. The team is based in Copenhagen, but their goal is to operate sustainable changes in Tanzania since 2015. Jengo focuses on the 17 sustainable development goals, such as gender equality and climate change. Jengo has before made projects as digital learning, where Lenovo supported tablets for Maasai villages, the goal with this implementation was to give access to and increase knowledge and information mainly for children and women. Another project was building smart stations, this was a project that gave the local women the opportunity to earn money by selling electricity and goods. Jengo stands for "build" in Swahili. And they are building up a new project for women's rights and independence, that they need help for. In Tanzania, the men have the power and the ownership of many women. In Tanzania women get forced into marriage, they're low educated and don't have many rights. So by working on this project and getting it accomplished, the women get more freedom to become more independent and free from

this man-dominated culture. Females are earning money by selling milk, that gets produced for cheese. And in between this process, there is a lot of bad hygiene as mentioned before, that could get improved.[2]

3 Hard Nut

Jengo has described their biggest problem being hygiene from cow to cheese. Therefore, we have looked at sustainable and inexpensive solutions to solve the problem. Our problem statement reads as follows:

How can they optimize the quality of the milk so that they minimize milk waste and thereby promote both the quality of the milk and the production.?
- Below, it will be obvious to investigate how the milk should be stored during milking and transport.
- Furthermore, how hygiene can be made more efficient so that the standard of milk is maintained.How can they optimize the quality of the milk so that they minimize milk waste and thereby promote both the quality of the milk and the production.?

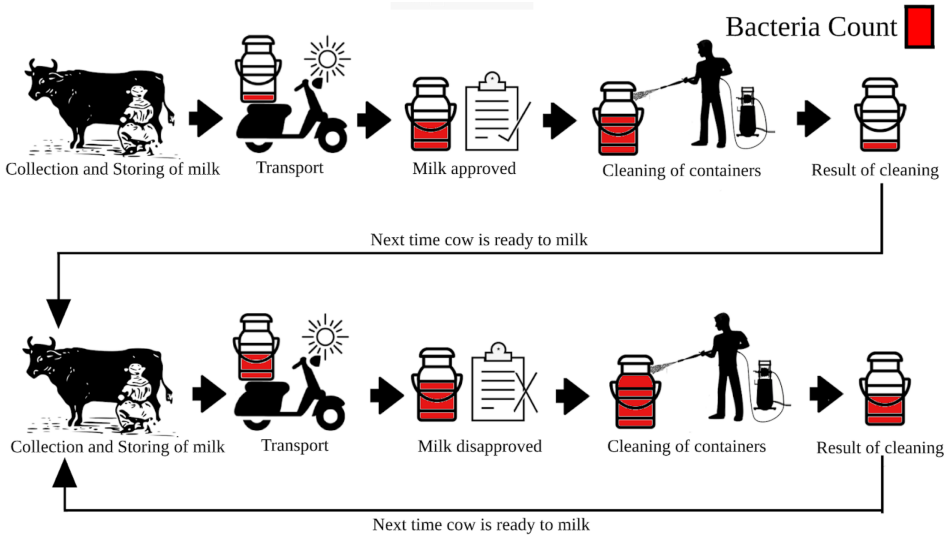

Figure 1: Problem

4 Your proposal and the reasons for it

Our proposal is to optimize the cleaning/hygiene after milking. And it's about cleaning the containers after the milk has been delivered to the factory. That way, the Maasai village will receive

clean containers. For this proposal, we have examined several factors that can be crucial for good hygiene. Among other things, we have looked at how this problem is solved in other countries, and in this way, we can see which things are important and which are repeated in different countries. For instance, we can compare it with Denmark, which has a high standard of handling milk. The way how the milking works in Denmark are based on 5 different phases. There is cleaning before milking, a control of the milk, the actual milking, raw milk, and control of the dairy.[3] This procedure is well-functioning and a good technique for milking. There is therefore a lot to learn from Danish dairy production. All phases are more or less important for an optimal milking process.
The way of extracting the milk and selling it should look as follows:
We start with pure milk out of the cow. Udders are cleaned with clean cloths. Milking is done with clean hands, the milk is collected from clean buckets in a clean container. Then it is exposed to heat, a bacterial culture grows in the container, the container is transported, and more bacterial culture grows, but still a little, the milk is tested and approved. Buckets and containers are cleaned in the factory.
What is missing is the pasteurization of the milk, where heat is applied. Another part is that they are not aware of the hygiene, how they extract the milk and collect it in a common container.

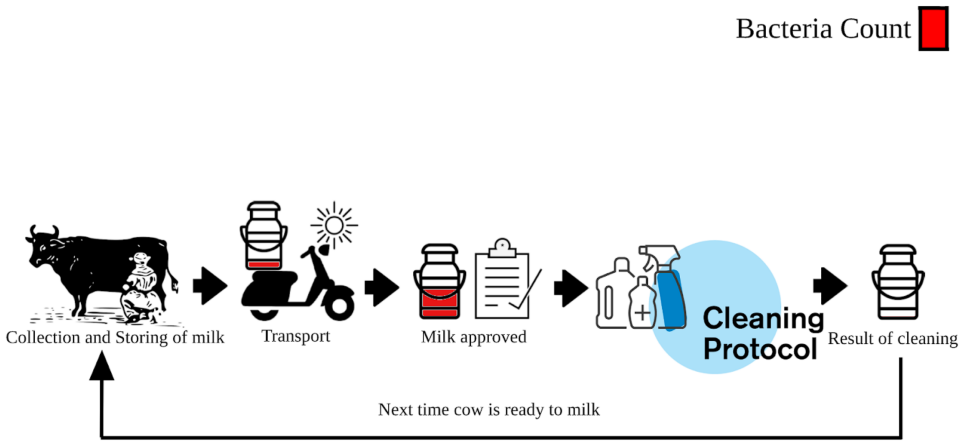

Figure 2: Solution

The main reason why we want to improve the milking process is that we want to ensure that the milk reaches the cheese factory in the best possible way. We especially want to ensure that some bad milk is not driven to the factory in vain. And that they instead receive something that can be used. The better the milk is, the more cheese the factory will be able to produce. And more cheese equals more profit. This goes back to the fact that the better cleaning they have, the less wasted milk and work there will be for the Maasai people.

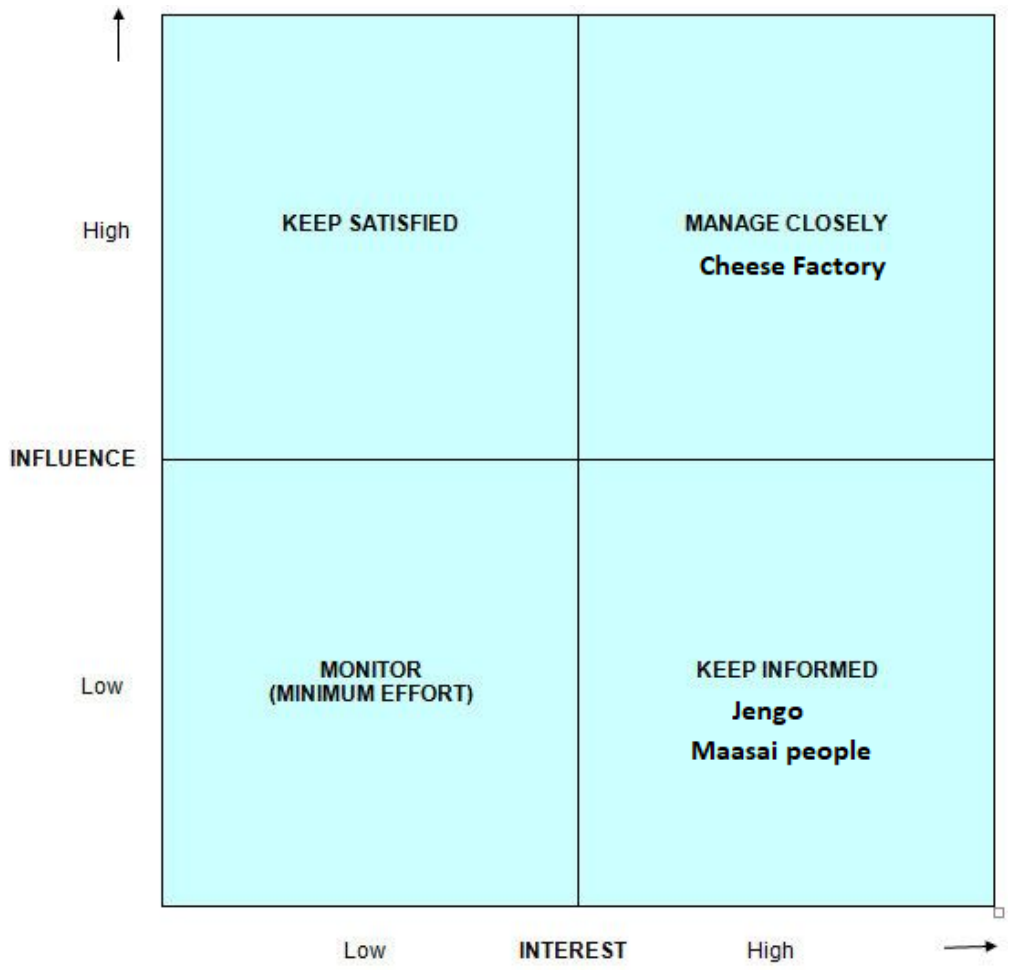

Figure 3: Stakeholder Analysis

The figure here shows the three stakeholders in the project, which are the cheese factory, Jengo, and the Maasai people. They are ranked according to how much interest and influence they have on the solution. For example, the cheese factory has both a high interest in the solution and at the same time a high influence, because the solution can determine whether they get a better cheese production. It is also up to them how much effort they put into implementing the solution in the best possible way. Therefore they are placed in the "Manage Closely" section.

Jengo and the Maasai people do have a high interest in the solution, but the influence is low. This is because they also want improved cheeses and milk production. But they are not implementing the solution, which makes them "Keep Informed".

We as a group had been visiting a farm in Lejre, where we talked to a farmer named Peter Sivertsen about his dairy and all the questions we had about cows. We also explained and validated our solution with him. According to him, it could well be possible to implement this cleaning protocol in Tanzania.

5 Prototype - Cleaning protocol

In this chapter, we will describe what a sanitation protocol could and should look like. For all these steps, there must be made illustrations that properly depict the description. A protocol like this with accurate illustrations should then be given as a pamphlet and taught to the correct actors.

5.1 Cleaning Detergent

In the theory any soap should be usable, as long the whole container is coated with soap and the soap is not diluted. A commercial liquid soap would also work and could be a good alternative in an environment with a smaller water supply.[4]

5.2 Container selection and Quality Control

When choosing a container for milk handling or transportation, containers made from aluminum cans or stainless steel are preferred. Furthermore, the container should be able to fill these:

1. Have smooth finishes free from open seams, cracks, dents, and rust.
2. Have wide openings such that every surface that comes into contact with milk can be accessed easily for cleaning and sanitation.
3. In this regard, both metal and plastic containers with dead ends should not be used for handling and storage of milk.
4. Be used only for handling and storing milk [5]

5.3 Plastic Container

First and foremost the use of plastic containers is not advisable, as plastic is easily scratched, sensitive to heat, and prolonged exposure to cleaning agents. This gives the plastic a higher probability of multiplication of microorganisms and makes it difficult to clean, hence making plastic a potential source for contamination of milk with spoilage and pathogenic microorganism. All of these complications make the milk unsafe for human consumption or processing before even reaching its destination.[5],[6] Most food-grade plastic containers are made for single use only and should therefore be avoided.[7] If the reuse of plastic containers is a must, the plastic container should be made of hard plastic and should be cleaned as following this protocol:

1. Pre-rinse the container soon after use.
2. Thoroughly scrub the container with warm water and detergent or soap (using a stiff-bristled hand brush or scouring pad).

3. Rinse the container in clean running water to prevent detergent residues from contaminating the milk.

4. Dip-rinse the container in boiling water for at least one minute to kill germs. You may also rinse the container by pouring hot water into it.

5. Air-dry the container in an inverted position on a clean rack in the open. [7]

5.4 Metal Container

The cleaning of the metal container is done as follows:

1. Rinse thoroughly with lukewarm water(35-38 degrees Celsius) until all milk residues are gone (clear water).

2. Fill the tank with hot water, above 75 degrees Celsius, and circulate for approx. 2 minutes for heating the tank. Empty the tank of water.

3. Fill the tank with hot water (above 75 degrees Celsius) again and add alkaline detergent.

4. The solution circulates for 8-10 minutes. the washing water temperature must comply with 60-70 degrees.

5. Cleaning is completed before the wash water temperature reaches below 42 degrees.

6. Rinse with cold water for a minimum of 1 minute.

7. Fill the cooling tank with cold water and add disinfectant or acid sulphate.

8. The solution circulates for 4-5 minutes.

9. The tank is drained and rinsed thoroughly with clean drinking water until all disinfectant / acid sulphate is out of the tank.

10. Sun dry the container upside down on a drying rack [8], [9]

5.5 Storing containers

When storing the clean containers, the containers should never be placed in direct sunlight and should never be closed with the lid. A clean milk container should never be closed with the lid, as this enclosed space would make any milk container smell horrendously, regardless of the sanitation of said container.[4]

6 Business and Economic perspective

Good Hygiene directly affects the economic perspective of the business. At the moment some milk has to be thrown out, as the milk has gone bad. When the milk is discarded, all the work done milking the cow, storing the milk, and transporting the milk is also discarded. When the milk is discarded, you also discard the opportunity for profit from the cheese. When looking into this scenario there are a couple of different actors who benefit from a better cleaning of the containers.

6.1 Maasai

Looking at this from the Maasai perspective, there are two clear problems. The first problem is that the milk the Maasai women collect is collected in an unhygienic way, which makes the milk go bad. This scenario is a problem, however, it is an enormous problem, that we are not able to figure out a definitive solution for. The second problem is when the Maasai women collect the milk hygienically and their milk is of high quality. This high-quality milk is then put into an unhygienic container and ruined in this process. This is a problem, as it makes the Maasai women believe that their good hygienic practice is in vain. Therefore it is vital that the milk's bacteria culture is not further accelerated after the Maasai women have delivered it to the transporter. This will ensure proper compensation for the Maasai women.

6.2 Cheese factory

From the cheese factory's point of view, a general increase in milk quality would increase the amount of milk that could be made into cheese and increase the quality of cheese and in this way directly increase profit. However, the job of cleaning the containers would be the factory's responsibility, hence generating more work for the three employees. There would be a process of teaching the factory workers the importance of proper hygiene and the cleaning protocol. Implementing these things should however be noticeable when testing the quality of their milk, and in this way reinforce the importance of proper hygiene.[6] This extra capital could then be used to acquire aluminum or stainless steel containers, because they are easier to clean and more durable, which again would promote better hygiene.[6]

6.3 Jengo

This change would empower the Maasai women and result in proper compensation for the Maasai women. This proper compensation for work would increase the women's societal opportunities and in this way fulfill Jengo's goals. However, Jengo would be the primary driver in convincing the factory workers of the importance of proper hygiene.

6.4 How a new sanitation protocol would one-up the competition

Implementing these things would increase the quality of the factory's cheese, therefore making it a high-quality product in an environment where hygienic milk is scarce.[10], [11] Making a cheese that meets the higher hygienic requirements would increase the amount of cheese and other milk products sold to high rated- restaurants, -hotels and -establishments. Furthermore selling products produced from Maasai milkCulture can be sold as a premium products for European consumption. However, these products should then also meet some of the hygienic requirements of European society.[12],[13] ,[14]

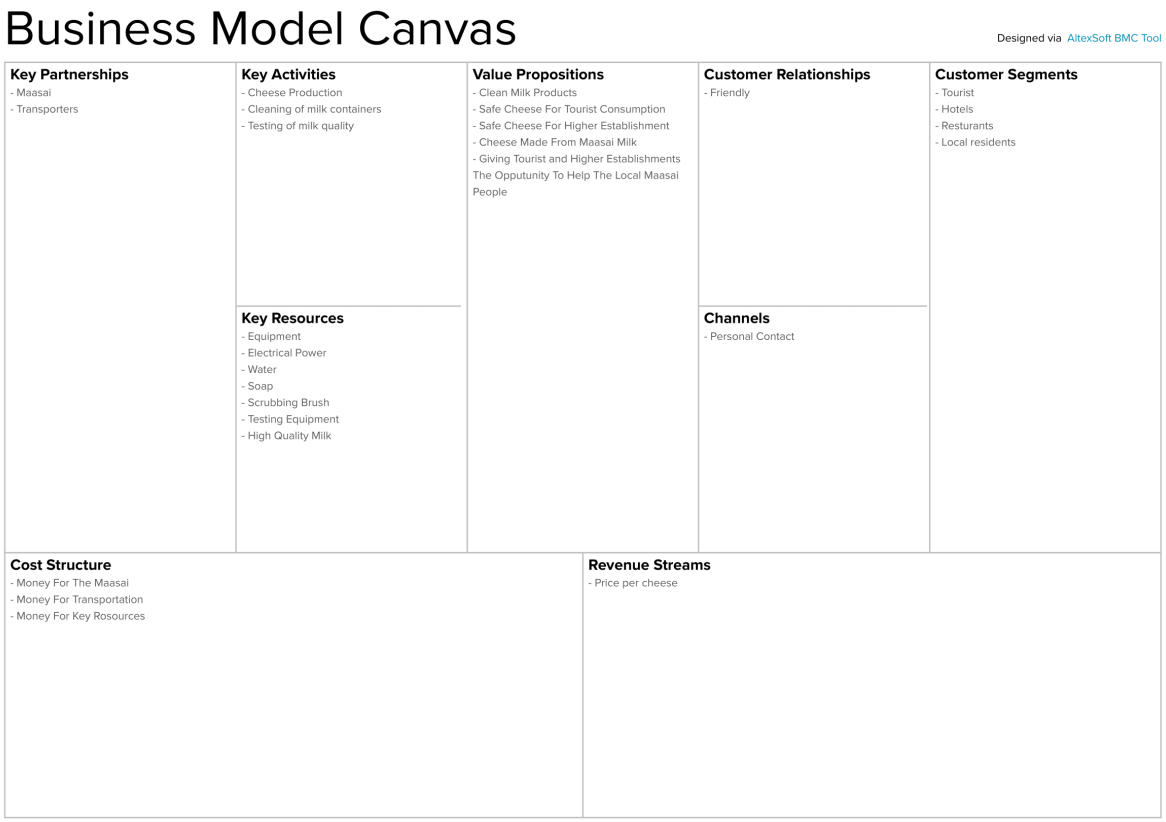

Figure 4: Buisness Model Canvas

7 Further perspectives

The implementation of our solution is by creating a cleaning protocol that will be used to educate the fabric employees to follow the guidelines, to get the best and most affordable cleaning method. Instead of trying to educate a large group, and expect that all Maasai people will learn this cleaning protocol, we have minimized the scope in the begging to the employees. If it becomes a success, the scope could be increased and there could be educated more people. A way of educating more people is by looking into the female network in Tanzania, the big network is led by a main female

leader, that has two or three other females under her, and these two or three females, have two or three other females under them, and then the chain continues down. The network is already used to educate the top leader, which educates the females under her, and this way the knowledge and information goes down the chain. So another education method is by using the network to educate a lot of people about this new protocol.

8 Conclusion

This report has invigorated, that there is a need for better hygiene in the dairy collection, transportation, and production in the Tanzanian culture. Furthermore, it has been shown that a vital step in this process, when looking at Jengo's problems is proper cleaning of all the milking vessels. A solution has been put together where the factory workers must follow a sanitation protocol and clean the containers so that no good milk is ruined in the transportation process. In this way, the transporters would exchange their milk-filled containers for a cleaned container at the factory. Implementing these changes should result in more milk of a higher quality and could increase cheese sales to high rated- restaurants, -hotels, and -establishments and ensure proper compensation for the Maasai women's work and in this way increase their societal status.

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