PAD PROJECT PERIOD

Improving ZingiPad through four themes;
Production, Business, Material, and Education.

Reality STUDIO

CHALMERS
UNIVERSITY OF TECHNOLOGY

PAD PROJECT PERIOD

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Reality Studio, 2020
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The authors own all pictures and illustrations included in this booklet.

CHALMERS
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Reality STUDIO

ACKNOWLEDGEMENTS

This year was different for all of the Reality Studio projects. All of the projects were affected by the coronavirus, Covid-19. Because of the virus, Chalmers University of Technology decided that all education during 2020 will be carried out remotely. Unfortunately, the field study performed in Kisumu was affected by this decision and had to be aborted. The result of the project will therefore only include one and a half week of project work in Kenya instead of the originally planned four weeks.

Even though the Covid-19 outbreak changed the circumstances, the project group managed to continue with the project. The project is still considered to be successful, partly because of the amazing people from Zingira, Evance Odhiambo, Arnnette Okeyo, Fred Okeyo, and of course their fantastic children Victory, Kimberly, Ethan, and Evan who participated in many of our weekly online meetings. They have helped us create the result of the project and also to evaluate the solutions. They have been a big support through these times, it has been a delight to collaborate with you guys, so a big Asante Sana to you!

Other people who have given us a lot of input and feedback are our tutors, Shea Hagy, Catarina Östlund, and Emílio Da Cruz Brandão. Thank you for being a part of the project, and for all the help and input we have received from you guys. We would also like to thank you for being very supportive during the unfortunate pandemic situation and for guiding all the students back home. Finally thank you, Shea, for playing your little guitar thing on the rooftop of Sooper guest house, it made the final evenings last a little bit longer.

We would also like to thank both Larry Toups and Todd Nicewonger for participating in the project and giving us feedback. Thank you for all of the conversations over the dining table, it has been fun getting to know you.

Finally, we would like to thank Hans Assarsson from Kvarnbyns Handpappersbruk in Mölndal. He helped us to process some of the material used for the project and to turn it into paper, we are very grateful for you taking your time to help us.

Thanks to all of you for your help and encouragement!

ABSTRACT

Even though almost half of the world population are women, menstruation is seen as a taboo in many countries around the world. In Kenya, the attendance among adolescent girls in school is decreasing, girls even drop out of school due to the limited access to sanitary products such as menstruation pads.

During Reality Studio, many projects involving the sanitary pad, ZingiPad have been performed. This year the Pad Project Period was executed, the vision of the project is to make a difference for young girls in Kenya and also for the organization Zingira. Zingira is a community based organization that coordinates with local artisans to produce products from recycled and locally sourced materials. One of their products is the ZingiPad, which is sold to local schools and aims to help girls and women who can not afford to buy sanitary products. If the production would increase it would result in more girls getting access to sanitary pads. If the production of sanitary pads at Zingira would improve the income will increase, which will help the organization develop to be more impactful.

To reach the aim, the project was divided into four themes, Production, Business, Material, and Education. Each theme has a different aim, which is important for reaching the main aim and purpose of the project.

The production theme aimed to improve the production process and make it more efficient by developing additional tools and instructions. Currently, only two people are working in the production. In order to expand there is a need for improving multiple of the stations.

The business theme aimed to give Zingira more insights within costs such as salaries, production costs, and prices for the pads. The project will also provide Zingira with a business model for understanding the economic situation.

The material theme aimed to investigate new potential materials that can be used in the pads. Bagasse was presented as a new option for the absorbent material, due to its advantageous properties and ease of getting hold of.

The education theme aimed to develop Zingira's Menstrual Awareness Program by creating an age adapted activity tool for their educational program. The tool will spread knowledge regarding the topic and work against its taboo.

In conclusion, Zingira will be provided with an action plan on how to implement the solutions from the four themes. The four themes are connected and actions in all of them will be necessary for Zingira to develop as an organization and for them to reach more girls with ZingiPads.

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INTRODUCTION

AUTHORS

The project group consists of four students; Fredrik Karlsson, Elin Ljungberg, Sandra Sköld, and Thea Widdgård who are all studying the Master's program Industrial Design Engineering at Chalmers University of Technology. The project is a part of the Reality Studio course, which includes a field study taking place in Kisumu, Kenya during 2020. The group was formed based on the ambition to work together with the organization Zingira on several parts of the ZingiPad business. The project group chose the project because of the prospect of making a difference for women and young girls in Kisumu.

SANDRA

THEA

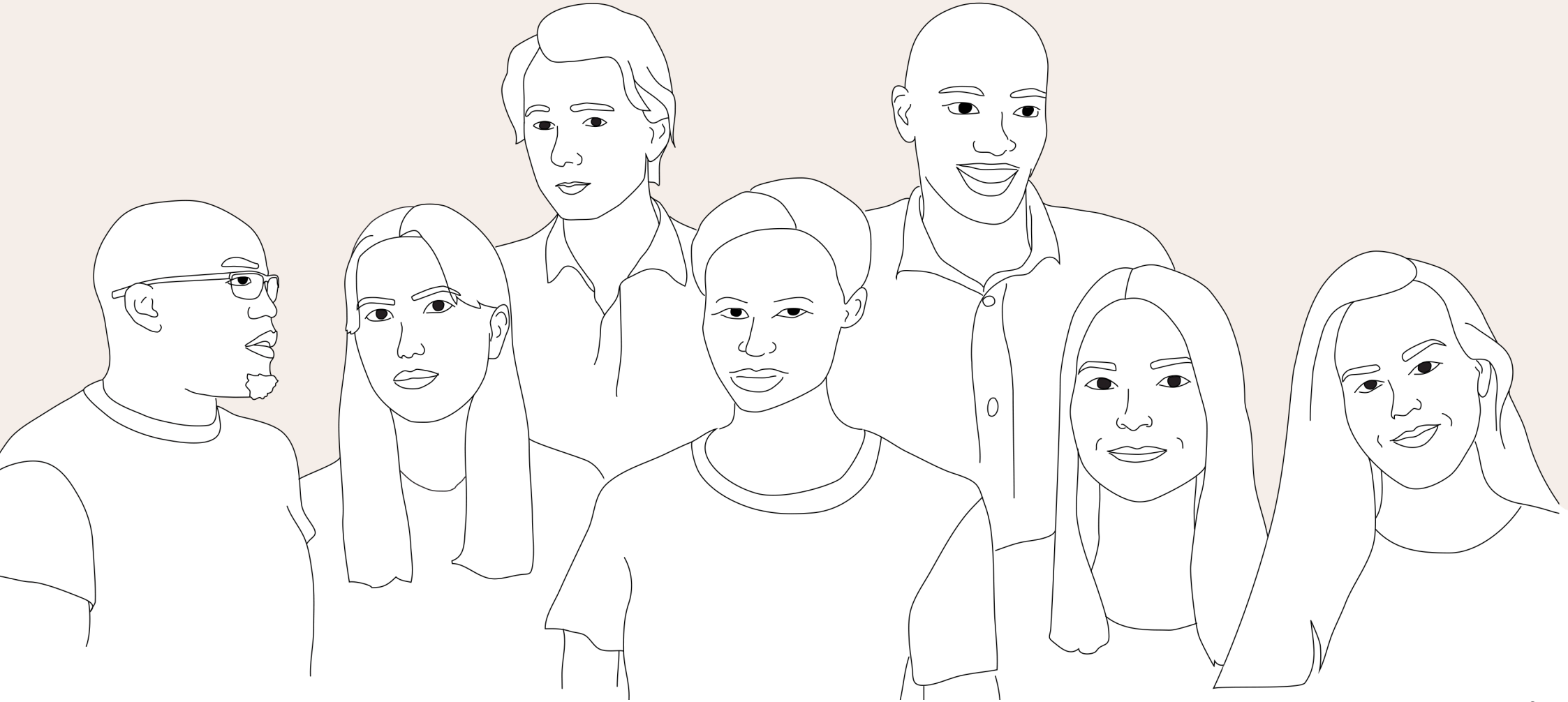
FREDRIK

ELIN

PAD TEAM

The pad team is a combination of the project team and the main stakeholder Zingira. This is the team that has collaborated during this project and the collaboration has been successful both on site in Kisumu and through online communication between Sweden and Kenya. During the project, several workshops and weekly meetings have been held together.

The collaboration has been beneficial for both parties where the project team has been able to evaluate the proposed solutions together with Zingira and therefore learned what parts work and not work in the context. Zingira has benefited from the collaboration by receiving input on improvements and new ideas that can be used to evolve their organization.

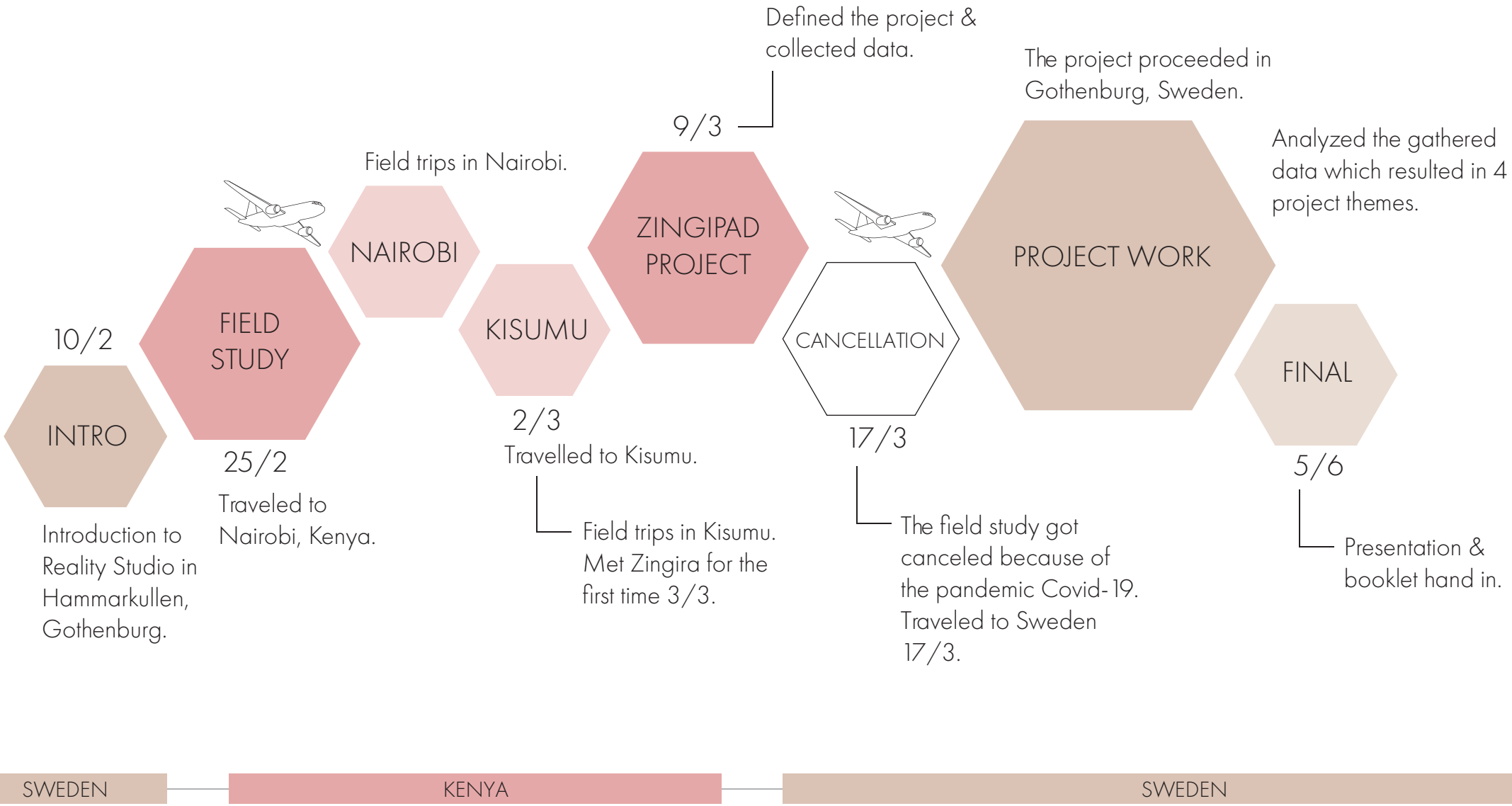


VISION & AIM

The vision is to provide more girls in Kenya with sanitary products and education about menstrual health. As a complement, the project's vision is to help Zingira become a more impactful organization and be able to reach more girls. If the production volume increases more girls will get access to affordable sanitary products and Zingira will get a larger revenue, and be able to develop as an organization.

The aim of the project is to provide solutions that can help to fulfill the goal of both reaching more girls with sanitary pads and provide awareness of menstrual health. To reach the aim the project was divided into four themes, Production, Business, Material, and Education. Production focuses on three parts; improve time efficiency, facilitate learning, and solve spatial issues. The business will be clarified to create transparency and understanding among the Zingira team, and help Zingira to increase salaris and save money for future expenses. Further, the project aims at exploring potential biodegradable materials that could be used when existing materials in the production run out. The materials that will be explored are only biodegradable ones since Zingira have a vision of creating a fully biodegradable pad. The Educational material used by Zingira will also be looked upon in order to find new ways of educating girls and create menstrual awareness.

Provide more girls with sanitary products and education about menstrual health.



TIMELINE 2020

UN SUSTAINABILITY GOALS

3 GOOD HEALTH AND WELL-BEING

Improving girls' menstrual hygiene will also improve the girls' physical and psychological health at large. Many girls in the slums lack education and tools to properly manage their menstrual health. This can lead to the development of health issues, interference with their education, and social complications.

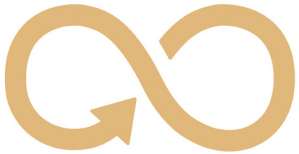
5 GENDER EQUALITY

Girls should have the same opportunities as boys, a factor as menstruation should not be a barrier to that. In developing countries, girls who are menstruating often stay home from school due to the absence of sanitary products. This lack depends on the widespread poverty that exists in these developing countries. When girls stay home from school they have a harder time making their schooling successful, which will affect their opportunities in life. There is also a lack of education about menstrual health which makes it harder for girls to understand how to act when on their period.

4 QUALITY EDUCATION

Kenyan education lacks a curriculum that explains menstruation and other bodily transformations that are taboo. The children need to be educated about this subject to abolish the taboo regarding menstruation and to enable the same school opportunities for boys and girls.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



By choosing more sustainable materials for the component of the pads they will become more eco-friendly. This is of great importance in informal settlements, since it is difficult to manage waste. Making the production of the pads more efficient will also make it possible for more consumers to choose ZingiPads which is a more sustainable option.

Further, this project will implement one goal from the Kenyan National Goals of Education; Promote positive attitudes towards good health and environmental protection. This is to be carried out through education regarding menstruation and sanitary products, and the major importance of how that can affect the health of women.

BACKGROUND

KENYA

Kenya is a developing country located in eastern Africa with a population of 53 million people (Worldometer, 2020). Examples of factors that define a developing country are countries with; low living standards, undeveloped industrial base, and low Human Development Index (IGI Global, nd.). Despite the continuous development, one of three people live in poverty within Kenya and one of the largest slums of Africa, Kibera with 1 million residents, is located in the capital city Nairobi (Sida, 2019). Nairobi has one of Africa's largest informal settlements but also the United Nations headquarters of Africa. Kenya is a country with peaks and troughs. There are more than 40 different tribes within Kenya and they all contribute to a variety in culture, languages, and traditions. Most Kenyans are trilingual and speak at least two African languages and English. English is one of the two national languages as a result of the British colonization. The second national language is Swahili.

KISUMU

The field study took place in Kenya's third largest city, Kisumu. Kisumu is located in the western parts of Kenya and by the northern shore of Lake Victoria. The number of residents rises towards 600 000. Kisumu is known for agriculture and fishing because of the proximity to the lake, which also affects the climate to be rainier than other parts of Kenya. 60 % of the people in Kisumu live in informal settlements whereas the largest one is called Obunga.

INFORMAL SETTTLEEMNTS

United Nations (2015) describe informal settlements as areas where the inhabitants lack security, lack availability to basic services and infrastructure. The housing does not comply with regulations and is often located in more dangerous areas.

In Kisumu, the largest informal settlements are Obunga and Nyalenda. The structures of Obunga are weak and non- or semi-permanent. The housing lacks water and has limited access to electricity, and the roads that guide you through the area are often stomped garbage. In these informal settlements, the legal rights are informal, which means the schools located in Obunga and other informal settlements also are. Many schools are run by single enthusiasts that educate children getting almost no payment for it. One teacher can be responsible for up to 200 pupils, which has a massive negative impact on the education (Nehanda Radio, 2014).

Religion, tradition, and culture are highly valued in areas defined as informal settlements. This has created an old-fashioned way of looking at subjects as the female body, menstruation, and sex and sexuality. This forms a taboo regarding these subjects and a difficulty to discuss them.

ZINGIRA COMMUNITY CRAFTS

Zingira, in fact called Zingira Community Crafts, is a community based organization in Kisumu. Zinigira was founded by Evance Odhiambo in 2005, they coordinate local artisans to produce and provide products made from recycled and locally sourced materials. Zingira also manufactures sanitary pads since 2016.

The products that Zingira currently produces are ropes, trays, and baskets out of dried water hyacinth, paper and postcards from a mixture of recycled paper and water hyacinth, and they also produce sanitary pads. The purpose of the pads is to be sold to schools for a reasonable price to help girls and women who can not afford to buy sanitary products. When they make small profits the aim is to use that capital to educate school children, teachers, hospital staff, and community members about menstruation and female health. This is done to potentially improve life for both men and women in Kisumu and the surrounding area. The education is called Zingira Menstrual Awareness Program and is held by Zingira's Social team.

THE TABOO OF MENSTRUATION

Menstruation is a big taboo in Kenya, even though it is as normal as growing a beard according to Evance. The attendance among adolescent girls in school still decreases, girls even drop out of school due to the limited access to sanitary products such as menstruation pads (Secor-Turner, Schmitz and Benson, 2016). During an interview with Evance, he mentions that some girls have to choose between buying food or sanitary products.

Educating and teaching the girls about menstruation and sanitary products will keep them in school which could prevent early marriages, sexual harms and also giving the girls a chance of equity economic (Alexander, Eleveld, Laserson, Mason, Mohammed, Nyothach, Odhiambo, Phillips-Howard, Rheingans and Vulule, 2013). The education Zingira provides enlighten both boys and girls about their bodily changes and what happens during puberty. They also teach the girls how to handle the menstruation and how to use a pad instead of a cloth. Many girls have never seen a pad before and do not know how to use it or how often it should be changed. In many families, girls live solely with their fathers or uncles, who have limited knowledge about menstruation.

According to Evance, menstruation is a reason why many girls commit suicide. It is seen as an abomination if the blood would get stuck in the clothes.

Buying sanitary products is also something the women struggle with, due to the taboo regarding menstruation. Women hide their sanitary products among other groceries in the shopping basket. After purchase, they pack the sanitary products hidden in their grocery bags.

"Menses is as normal as growing a beard"

Evance Odhiambo

HISTORY OF ZINGIPAD

As mentioned, Zingira develops multiple products and one of them is the ZingiPad. The idea of ZingiPads originated from the female workers who sold handmade baskets to earn money. The women later faced the choice of buying either sanitary products or food, which led them to use homemade pads. Zingira acknowledged this need and started working on producing affordable pads. The initial idea was to produce the pads by using the water hyacinths covering Lake Victoria and sell them to the women in Kisumu. There have been two previous Reality Studio projects involving the pads, the first one in 2009, where a group of industrial design engineer students developed a pad from water hyacinths which made it 100% biocompostable. The result was called JaniPad, but according to Evance the pads were not considered hygienic enough due to its aesthetics and quality. The pads were toxicity tested and approved in 2010, which enabled the project to continue. However, the water hyacinth pad had a brown color and that was not considered hygienic or clean enough according to customers of Zingira. This made it difficult to sell the product.

Later in 2016, Zingira started to collaborate together with Aakar Innovations, an Indian company producing sanitary pads. Both the machines and the material Zingira currently uses are donated from Aakar Innovations, whose vision is to create awareness about menstruation hygiene and make sanitary pads more accessible (Aakar, 2018). They want to empower women by informing them and offering them affordable and environmentally friendly menstruation pads, also for them to control the development and the production of the pads.

In 2018, another Reality Studio group worked with the ZingiPads. The project aimed to “Create a more sustainable menstruation for girls and women living in informal settlements and poorer households, to lower the inequalities girls and women face based on menstruation” (Lindvall, Tengroth, & Videberger, 2018). But even though the project from 2018 developed improved solutions and new ideas for distribution of the pads, it was not implemented into the production.

The ideas regarding the production included improvements but also much work for Zingira. Some of the solutions were also too expensive for Zingira to construct, which could be the main reason why it was not implemented.

During 2019, Sara Pettersson and Chalmers Innovation Office worked with Zingira for one year. The same year Engineers Without Borders organized toxicity tests that RISE performed in Sweden. The aim was to test the water hyacinth pads for heavy metals and the tests were similar to product tests for skincare and medical use. The result indicated that there was a high content of heavy metals in the materials compared to the test in 2010. The pads were therefore recommended not to have near the skin, and the involvement of water hyacinths ended in the pad production. During 2019 the packaging material was changed into a biodegradable bag. The bags were donated from biobag, a worldwide company manufacturing compostable and biodegradable products (Biobag, 2020).

2009

Reality Studio project with pads made from water hyacinth.

2016

Pad production equipment was donated from Aakar Innovations.

2018

Reality Studio project presenting solutions on how to make the production more efficient.

2019

Sara Pettersson and Chalmers Innovation Office worked together with Zingira for one year.

2020

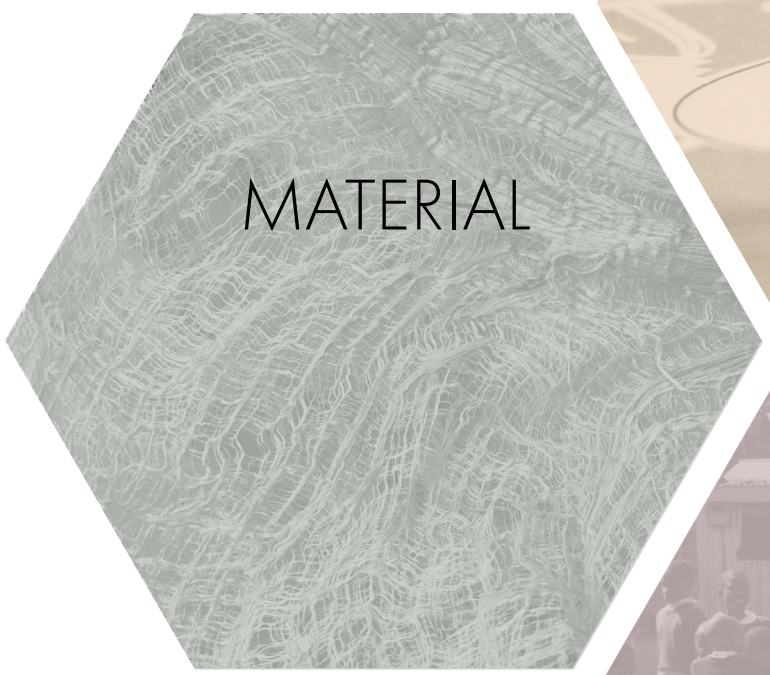
Current work with ZingiPad divided into 4 themes. Production, Business, Material & Education.

Future

After this years project an action plan will be sent to Zingira on what to do within each of the 4 themes.

4 THEMES

To reach the aim, the project was divided into four themes, Production, Business, Material, and Education. Each theme has a different aim, which is important for reaching the main aim and purpose of the project.



PRODUCTION

INTRODUCTION

Zingira manufactures ZingiPads which are estimated to consume 30-35% of the organization's time. The pads are produced and distributed by the Zingira team. Currently, the production team consists of two people Arnnette Okeyo and Fred Okeyo. To understand the production process two workshops were arranged during the field study. The workshop was performed for two days and involved the twelve production steps. Multiple interviews were also arranged in order to gather more information considering the production. To improve the production both recommendations regarding the production environment and supportive products have been developed.

AIM

The production part of the project aims to improve the process and make it more efficient through the development of new tools and methods. To achieve this aim it was divided into three smaller parts, improve time efficiency, facilitate learning, and solve spatial issues.

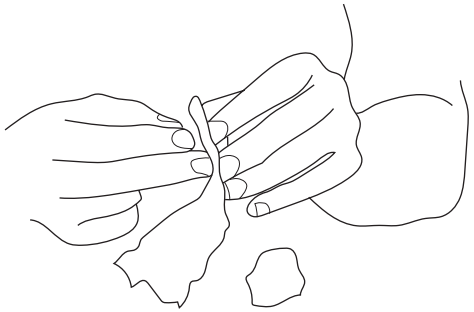
UNDERSTANDING THE SITUATION

To identify the problems regarding the production two workshops and several interviews were performed. During the first workshop, the project group produced ZingiPads during two working days and the second workshop included testing of improvements together with production method tests.

The first workshop focused on understanding and practicing all steps in the process of producing a ZingiPad. The workshop was organized by Arnnette and Fred who work with the production. The aim was to identify challenges and opportunities for improvement in the production of the pads. During the workshop, all steps were timed and documented by taking notes, photographs, and videos. Information regarding each step was carefully written down along with observed problems and challenges. The project group worked together with Arnnette and Fred and managed to produce 100 pads during the session.

The first part of the second workshop was dedicated to testing the possibility of tearing the pine paper using a jack plane. The first tearing test was to press several papers together and plane on the edge side of the papers. The hope was that the sturdiness of the paper edges would enable the jack plane to shred the paper into thin strips which then could be pulverized. The second test was to plane the paper on its flat side.

The second part of the workshop was to explore what sizes of pine paper pieces that are optimal to pulverize. The current guidelines for pulverizing pine paper are to feed the machine with small thin pieces of paper at a slow pace. The idea of the experiment was to feed the machine with different sizes of paper, in different thicknesses, and in various paces to see how it affected the produced pulp and the workload of the machine.

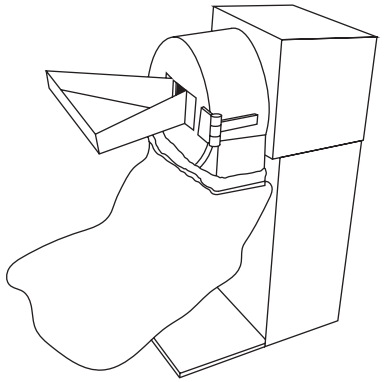


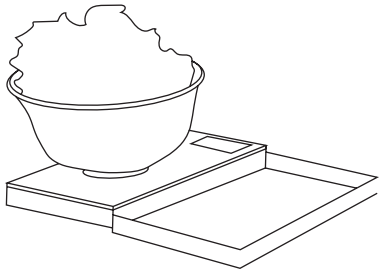
1. TEARING

The production begins with tearing paper by hand. The paper is used as the absorption material and is made of pinewood. In order to pulverize the paper into fluff pulp, the paper has to be torn into thin pieces.

2. PULVERIZING

During the next step the paper pieces put into the pulverizing machine. The machine can pulverize small thick pieces or thinner bigger pieces of paper. The large and thicker pieces get stuck hindering the smaller ones to be pulverized. The paper is torn apart, then pulverized and becomes fluff pulp that is collected in an airproof box.



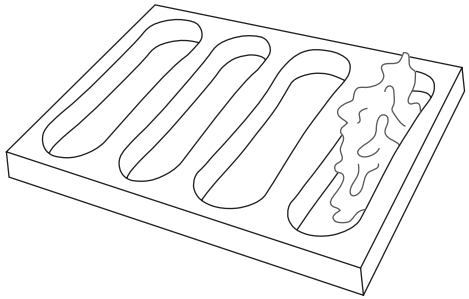


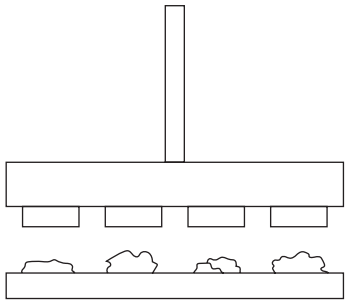
3. WEIGHING

The fluffy pulp is weighed for each pad, each pad should include seven grams of pulp. After the pulp is placed in the metal dies.

4. SPREADING

The fluff pulp is spread by hand in the metal die, this ensures that the pad will have an even thickness. The pads are made thicker in the middle part to ensure good absorption.



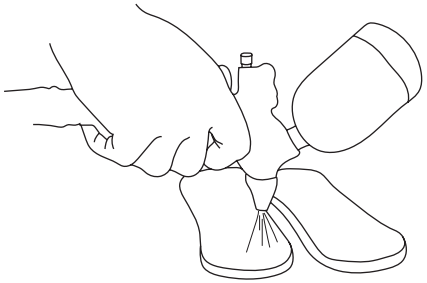


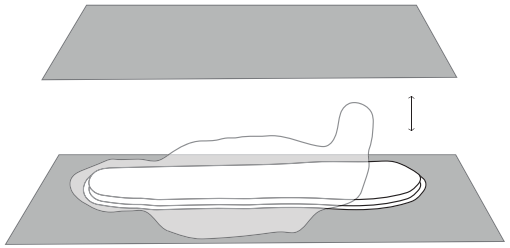
5. HAND OPERATED PRESS MACHINE

To get the final shape of the absorbing material the fluffy pulp is pressed in a manual machine. The pads have to be pressed four times to get the correct thickness to the pad. The die is later removed from the press machine and the pads are ejected from the die.

6. GUMMING

Before adding the gum, it is mixed with half part water and the pads area checked for dirt. The pads are placed near the gum machine on a plastic sheet and then sprayed with the gumming gun.



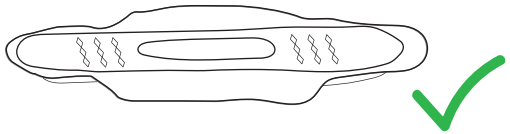


7. SEALING

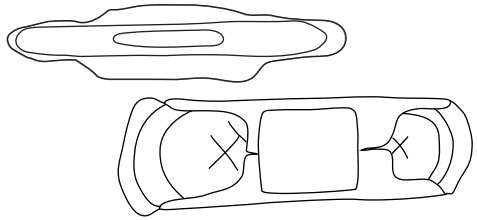
The sealing process is automatic, a layer of nonwoven, and a plastic layer covers the pressed pulp and is sealed in the machine. First, the plastic layer covers the template then the gum is added to attach the pressed pulp. Finally, a top layer of nonwoven is pulled over the pad and the machine is started. The operating time is 23 seconds, where the sealing lasts for seven seconds.

8. QUALITY CHECK

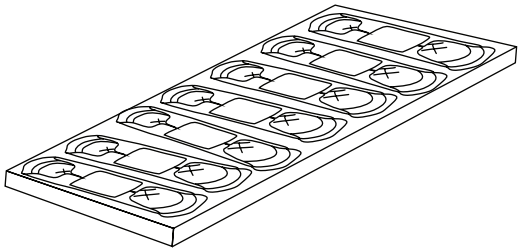
When the sealing is complete, the pad is removed from the sealing machine. The pads are quality checked for defects and sorted depending if it fulfills the requirements.



9. LABEL GUMMING UNIT



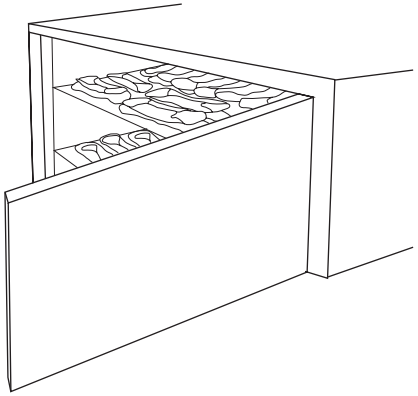
Paper pieces with gum are attached on the pads' wings and on the backside which later can be released and enable the pad to stick on the underwear. In the gumming station, the gum mixture is added into the machine and a paper with a slippery and a matte side goes through the machine. The sticky papers dry for ten minutes and are attached to the pad.



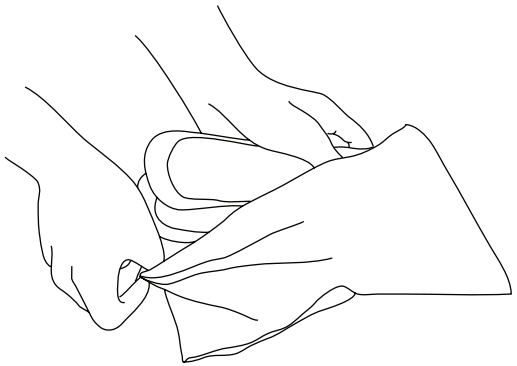
10. DRYING

The pads need to dry for six hours after the sticky papers have been attached. The pads are placed on a clean surface during the drying time.

11. STERILIZING



To sterilize the pads, they are placed two and two in a cabinet with UV lights for 20 minutes.

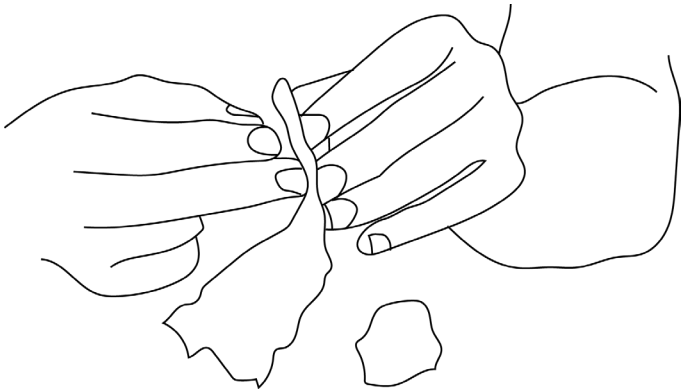


12. PACKAGING

To package the pads a roll of bioplastic is used together with an electric plastic bag sealer. Pieces of the biobag are cut and sealed on one side. The packages are filled with eight pads and then sealed on the other side. Finally, a sticker with logo and information about the pads are attached to the package.

TEARING

The main problems with tearing of the pine paper were that it is time consuming and that it is unclear what sizes of paper pieces that were good enough to be pulverized. To solve these problems a workshop was held where possible solutions for tearing the paper were tested along with tests where different sizes of paper were pulverized.



JACK PLANE

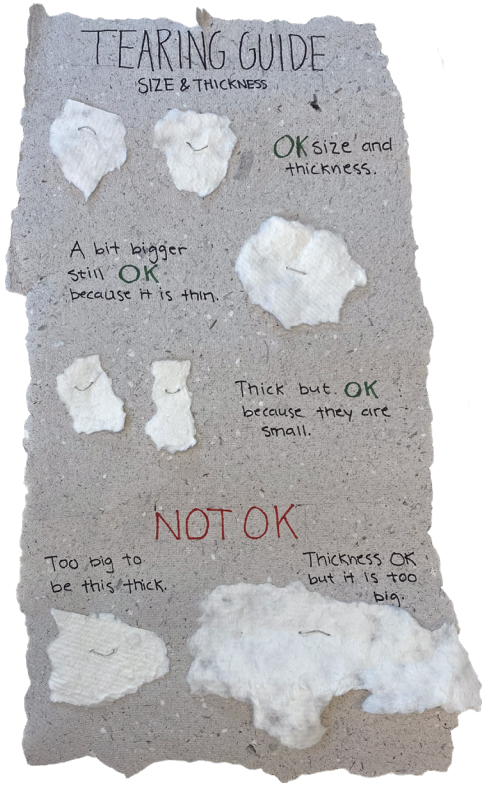
Tearing of the pine paper was done using a jack plane that was bought to test in the workshop. The pine paper was planed on both the edge and on its flat side. The best method turned out to be to plane the paper on its flat side whereas flaps of paper are ripped up on the surface which then can be grabbed and torn off. The advantage of this method was that it made it possible to tear off larger pieces of paper compared to when it is done solely by hand.

The time it takes one person to tear one pine paper by hand is two hours. Using the jack plane, tearing one paper took one person about one hour, which reduces the time consumption by 50%.

Because of Covid-19, there was no time to iterate the workshop where the jack plane was tested. However, the solution was tested further by the ZingiPad staff and is now used as a method in the production.

TEARING GUIDE

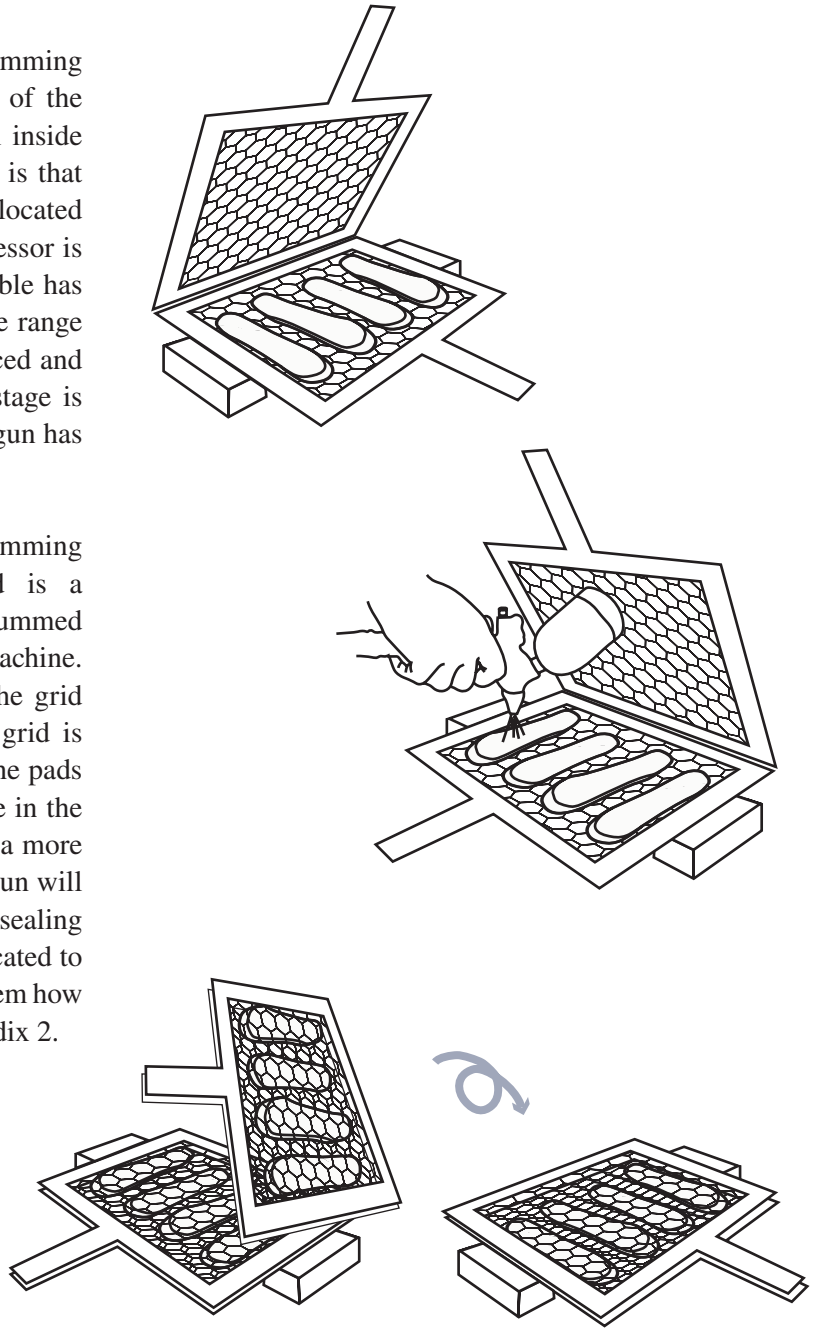
The second part of the workshop was to explore what sizes of pine paper pieces that are optimal to pulverize. The insight of this part of the workshop was that the machine withstands to pulverize small thick pieces and larger thin pieces as long as they are fed at a slow pace. To solve the issue where employees struggle with knowing what sizes of paper are okay or not a poster was made to present appropriate paper sizes. The poster has paper pieces attached to it, with explanatory texts, to enable employees to compare their torn pieces both visually and by touching them. An instruction sheet on how they can make this kind of poster was made and can be seen in appendix 1.

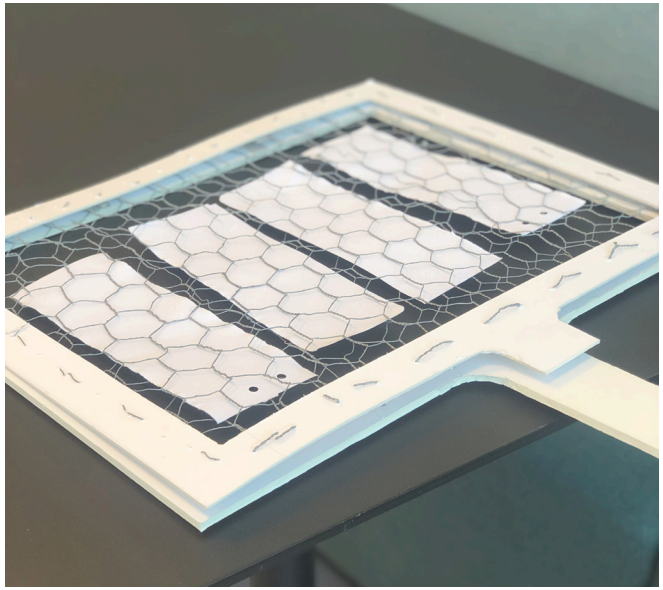


GUMMING GRID

In the current production of ZingiPads the gumming of the pads is done twice, once on one side of the pressed pulp and one time on the plastic film inside the sealing machine. The problem this causes is that the compressor to the glue gun is forced to be located close to the sealing machine. Since the compressor is locked to the sealing machine an additional table has to be put up in the production room within the range of the glue gun, where the pressed pulp is placed and gummed. Another problem in the gumming stage is that the risk of leakage is high since the spray gun has to be tilted to reach inside the sealing machine.

To solve these problems a concept called Gumming Grid was developed. The Gumming Grid is a construction where the pressed pulp can be gummed on both sides before being put in the sealing machine. When the pressed pulp pads are situated in the grid they will be gummed on one side, then the grid is closed and flipped and then the other side of the pads can be sprayed with gum. This saves both time in the production and allows the compressor to have a more convenient placement in the room. The spray gun will no longer leak as the step of spraying inside the sealing machine is removed. The solution is communicated to Zingira through a instruction sheet that show them how to make and use the gumming grid , see appendix 2.





EVALUATION OF GUMMING GRID

The solution has been evaluated both with Zingira and Aakar Innovations trough meetings showing a prototype. Zingira tested to spray both sides on the pressed pulp before putting it into the machine. The tests were successful and they will go on to build their own gumming grid using the provided instructions.

The Gumming Grid was displayed to Jaydeep at Aakar Innovations during an online interview and he contributed with some good insights. Jaydeep noted that this grid has to be easily cleaned because it will be in contact with sticky glue. Further, he mentioned that using a grid as the connecting surface for the pulp is the best option to avoid it getting stuck. The potential drawback with the concept that Jaydeep reflected about is if this gumming technique will affect the absorbing capacity. To test this theory Zingira are provided with instructions on how to perform an absorbtion test in the action plan.

PAD STAND

Before sterilizing and packaging of the pads they need to dry for 6 hours. Today's solution for drying the pads in the production is to put them side by side on shelves and tables in a storage room. When the pads are placed side by side there is room for 200 pads to dry. During the workshop Arnnette expressed that when producing a lot of pads it becomes difficult to fit them in the storage room for drying. To create more space for drying, a Pad Stand was developed. The stand was designed through an iterative prototyping process where different shapes were evaluated. The design was iterated from the guidelines:

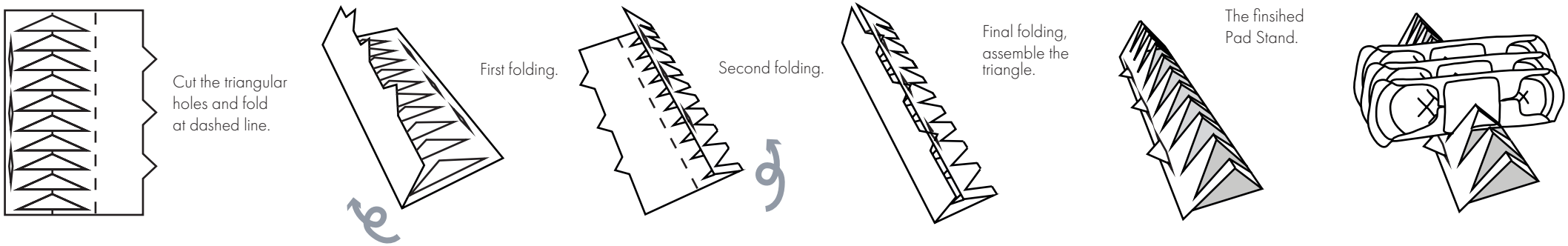
- Being easy to manufacture by Zingira
- Being easy and fast to place the pads into
- Use a small amount of material to make
- Contain many pads per footprint

The final design is used to store the pads vertically. Using this design 10 pads can be stored where 3 pads could be stored to dry before. This enables drying of about 660 pads where only 200 pads could dry before. The cut outs in the Pad Stand are triangular for minimizing the amounts of cuts. Also, if using a thinner material the cuts can be made by using scissors instead of a razor knife. The triangular shaped pockets for the pads make the opening for placing the pads big and the V shaped bottom makes them stick in the stand. The angle of the pockets makes all the pads fall in the same direction. The combination of a diamond shaped attachment hole and a triangular insert makes it possible to use different thicknesses of material. Thicker material will lock further out on the tip and thinner material further in. Zingira are urged to use old package material and cardboard that can be considered trash, this makes it important to consider the thickness parameter.

The Pad Stand design is communicated to Zingira using a paper template, see appendix 3. Further, Zingira will also be provided with an instruction sheet that visually explains the process of building the Pad Stand and required materials and tools, see appendix 4.

EVALUATION OF PAD STAND

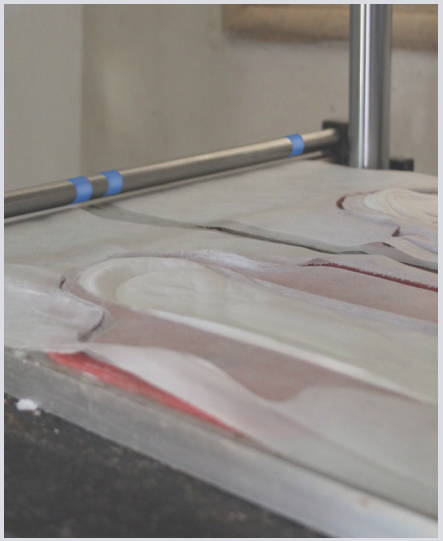
The Pad Stand has been evaluated together with both Zingira and Aakar Innovations. Zingira tried making the Pad Stand using the provided template and instructions. They were pleased with the result. Jaydeep at Aakar Innovations was positive towards the concept and said that it is a good idea for space efficiency.



TAPE - WASTE MATERIAL

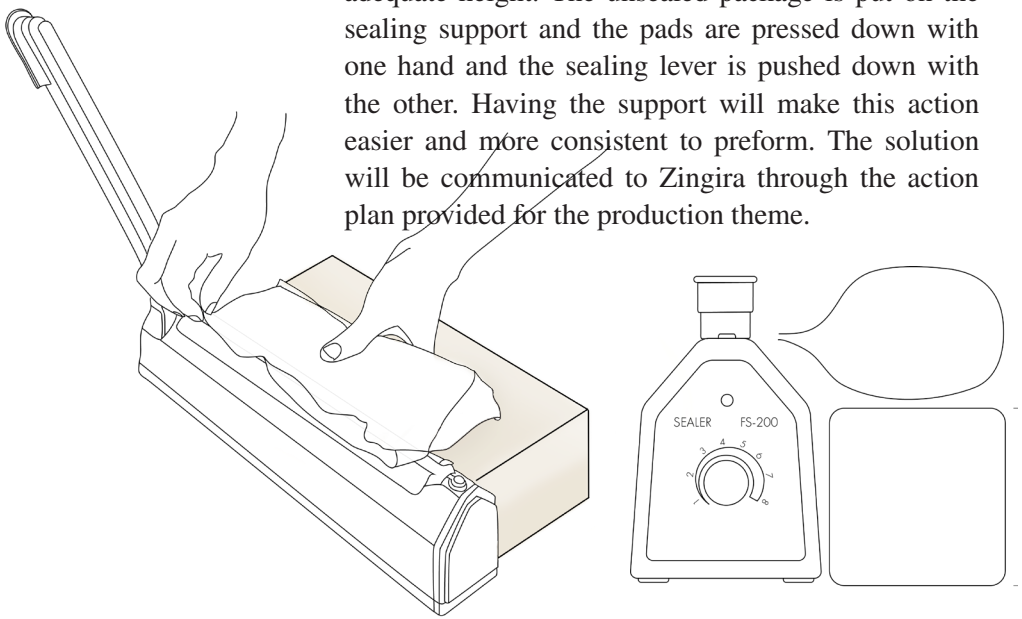
The markings on the sealing machine will help the workers to save time and to minimize waste material. The tape markings are placed on the rack on the opposite side from the material source. This solution will help the workers to place both the bottom plastic layer and the top nonwoven layer in the correct horizontal location. It will also help new employees to understand the task faster. If either of these materials were placed incorrectly the pad had to be disposed of, since the sealing would not be proper. To place the material between two markings will ensure a correct position of the material in a shorter time. The other tape marking will prevent unnecessary waste of the materials in the production through letting the workers know how far the material should be pulled for the next pad to be sealed. The position of the taped line is based on the minimum distance between two pads for both films.

The solution is communicated through instruction sheets in the action plan provided for the production theme. The solution has been evaluated and successfully tested by Zingira.



SEALING SUPPORT

When the pads are manufactured and ready to be packed Zingira use a plastic tube on a roll that is sealed with a plastic bag sealer. When the plastic tube is sealed on one side and eight pads are placed in the package the final seal is executed. The last step and seal of the package, being fully packed, is the most problematic and a sealing support will make that step less demanding. The issues with this step is that it is hard to know in what height to hold the unsealed package with pads and that the pads need to be pressed together in the package while at the same time the sealing lever needs to be pushed down. The support will ensure the height, act like a third hand that pushes from underneath, and keep the package stable during sealing. The sealing support needs to be in a height that makes the unsealed package in the middle of the sealing part. This could be a wood block in a adequate height. The unsealed package is put on the sealing support and the pads are pressed down with one hand and the sealing lever is pushed down with the other. Having the support will make this action easier and more consistent to preform. The solution will be communicated to Zingira through the action plan provided for the production theme.



BUSINESS

INTRODUCTION

As a business, ZingiPad is not aiming to make a big profit. Instead, they want to use their profit to reach more girls in informal settlements with the pads they produce and their Menstrual Awareness Program. As of now the business is having issues becoming profitable which needs to be solved to be able to create a bigger impact. ZingiPads lacks a vision or an action plan to bring them further. Right now they do not work on progressing anything businesswise. The ZingiPad business also has difficulties making profit and therefore the team decided to look at the business as a whole. Evance also expressed that he wishes to increase the salaries for the workers in the production and to save some money for future expenses. The low salary and unstable amount of working hours have made many resign from work which is costly for Zingira who then has to teach new workers from the beginning.

AIM

The aim of the business part is to give Zingira more insight in what they can pay in salaries to workers and how this can be based on the production speed and the price of the pads. The business part also aims to give Zingira a better understanding of the breakdown of the costs of the pad production. Working with the business aspects of ZingiPads will also help Zingira to understand the building blocks of the sanitary pads business and how they can work to improve the organization to make a bigger impact for young girls.

METHOD

Information has been gathered through interviews and meetings with Evance, discussing salaries, revenues, and costs. During our meetings, there have also been discussions about future opportunities. To understand the idea behind the production line, interviews with Jaydeep who is the founder of Aakar Innovation was conducted. He explained his view of how to run the business and also shared the costs and revenue calculations that they use now.

Because the group had little knowledge about what people in Kenya earn, salaries were looked up online to be able to compare the ZingiPad workers' salaries to something. The different inputs from interviews and workshops were all used in the analysis of the numbers and the mapping using the business model canvas.

The salaries used for compairison:

- Evance goal of having the workers earn 8 000 ksh/month.
- Reuters (2014) says that most people in Kibera earn 3 390 ksh or less per month, working every day.
- And according to Salary Explorer (2020) the lower average in Kisumu earns 19 400 ksh a month.

BUSINESS IN NUMBERS

Business Now

Number of pads	3 900
Number of staff	2
Total number om hours	280
Pads per hour per person	14
Price for 8 pads	50 ksh
Revenue from pad sales	24 400 ksh
Electricity, Distribution and Rent	- 19 500 ksh
Salary per person per month	2 450 ksh
Savings	0

Using the jackplane increases the total efficiency.

Increase the price to 60 ksh.

Vision for the ZingiPad business

Number of pads	7100
Number of staff	3
Total number om hours	420
Pads per hour per person	17
Price for 8 pads	60 ksh
Revenue from pad sales	53 300 ksh
Electricity, Distribution and Rent	- 20 700 ksh
Salary per person per month	9 500 ksh
Savings	4 100 ksh

Higher amount of pads per month lowers cost per pad.

Start to save for material purchases.

Increased salary.

Further vision for the ZingiPad business

Number of pads	11 800
Number of staff	5
Total number om hours	700
Pads per hour per person	17
Price for 8 pads	60 ksh
Revenue from pad sales	88 500 ksh
Electricity, Distribution and Rent	- 24 400 ksh
Salary per person per month	11 000 ksh
Savings	9 100 ksh

Increasing production volume further increases the profit.

The calculations that are done are based on information from interviews and from the workshops that were held together with Zingira. Additionally, estimations are used and assumptions have been made to be able to do the analysis. The calculations are done assuming that they are working seven hours a day producing pads for 20 days a month to be able to compare the constellations. How the times are counted and where the costs come from can be found in appendix 5.

From looking at the numbers, the suggestions that can improve the ZingiPad business is to add one worker to increase production volume per day and implement the use of the jack plane. The jack plane is expected to take half as much time as before. Finally, they should increase their price to 60 ksh instead of 50 ksh. Their pads are already cheaper than the competitors and they can not afford to have such a low price.

The result from the changes is estimated to lead to a higher production volume, increased salaries for the workers, and some savings that can be used for future expenses. Further, increasing the number of workers to five will continue to make the gap between revenue and cost bigger. The reason five is chosen is that the efficiency per person will probably not suffer up to that point. With more than five workers further rearrangements of the production flow have to be made. Being five people, three can produce and two can prepare material by tearing, pulverizing, and stamping.

Zingira have to accept that there can not be a lot of people in the production to start with. They have tried to hire a lot of people in the production in the past. This has led to economic implications and difficulties for workers to learn the job. Therefore, they should try to build up their workforce slower. Instead of trying to maximize the production output, it is better to find a balance. The first thing is to gain customers and after increasing the demand they can start to hire more people to be able to supply more pads. The pads have a good selling point in being more eco-friendly than competitors and foremost they are cheaper than their competitors'. What they lack is a way to reach customers with their message about the product and with the product itself.

BUSINESS MODEL CANVAS

Key Partners

For help with machines:

Aakar Innovatons, Jaydeep

For selling pads:

Schools.

Companies that buy for charity.

For research and development:

Chalmers, Reality Studio

Engineers Without Borders.

RISE.

Potential key partners:

Materials

Key Activities

Pad production.

Distribution of pads.

Menstrual awareness Education.

Key Recources

Arnnette and Fred.

Production machines and materials.

Education material.

Potential key recources:

Workers

Value Propositions

Environmentally friendly

Cheaper.

Locally produced.

Information about menstrual health.

Potential value:

Locally sourced materials.

Interactive education.

Customer Relationships

Personal communication with customers.

Channels

Mololine Courier for distrubution of pads.

Facebook page and personal interaction for distribution of information.

Potential channel:

Posters for marketing.

Local stores for selling. pads.

Customer Segments

Schools.

Companies that want to donate sanitary pads.

Potential Segments:

Individuals through local stores.

Cost Structure

Worker salaries, Distribution,

Electricity, Rent.

Potential costs: Materialss, Marketing.

Revenue Streams

Pad sales.

Doing education workshops.

To understand the business side of the ZingiPad a business model canvas was made. It was done both for mapping the business to see how it all fits together and for understanding new potential in their business.

The ZinigiPad business has different collaborators depending on purpose. Their most important collaborators are those who they sell the pads to and Aakar Innovation who help them to keep their machines running. To be able to improve on their business they also have partners that come with suggestions and improve their situation. The arrows in the business model canvas indicate how the boxes connect to each other and if something is added to one box that can form a chain reaction that creates a need to add something to another box. Knowing how the boxes connect also helps to understand how the ZingiPad business comes together.

A suggestion is to find a new customer segment in individuals and use local stores as channels. Having multiple local stores makes it easier to sell smaller quantities than what schools order. Having more segments can ensure a more constant production of pads, increase profit, and reach more girls.

REFLECTIONS

Zingira need to create a reliable production with workers that understand the procedures, they also need to create a balance between supply and demand that needs to follow when they scale up their production. Increasing the production will not matter if Zingira can not sell the produced pads, and finding new customers will not matter if they can not fill the demand. Therefore, it is important to look at the business holistically to balance the new changes.

One more suggestion is that Zingira create an inventory of pads which makes it less stressful when they receive an order. The workers' confidence will increase in being able to produce the amount of pads in time and then they will more likely be able to take on more and larger orders. Right now they have time in between orders that they can use.

Another suggestion, presented in the action plan, is to start collecting more data and take notes on things that the production team experience as good and bad to learn from their successes and shortcomings. Collecting this information will both make it easier for Zingira to understand what does and does not work but is also a great resource that can be used by people who want to help the organization.

Creating goals for themselves is also a suggestion, which can be impactful in developing Zingira. By having goals for what Zingira want to achieve with their business it is thought that it becomes easier for them to come up with solutions that move the organization in the right direction.

The responses from Zingira on the suggestions regarding the changes in the business have been taken into consideration. Being able to see in numbers how their business could change will hopefully make it easier for Zingira to understand what impact the changes can make. Understanding the impact will also improve the motivation for Zingira to work on improvement.

The suggestions that are made is together a start in making the ZingiPad business stand on its own. This is to be able to pay for materials, pay decent salaries and use money to have educational events.

MATERIAL

INTRODUCTION

In the current production, multiple materials are used. All of the materials were donated from Aakar Innovations, besides the packaging bags which were donated from Biobags. Zingira currently have a stock of materials that were donated by Aakar Innovations in 2016. The materials will eventually run out and there is a need of identifying potential future materials. Since Zingira have a vision of making their pads fully biodegradable the materials that are investigated are materials that suit that vision. To investigate new material possibilities research and interviews were executed and new materials were listed. Also, two workshops were conducted, one where materials absorption were tested, and one where the process of making paper was explored.

AIM

The aim of the material theme is to investigate and identify new possible materials that can be used in the production of ZingiPads.

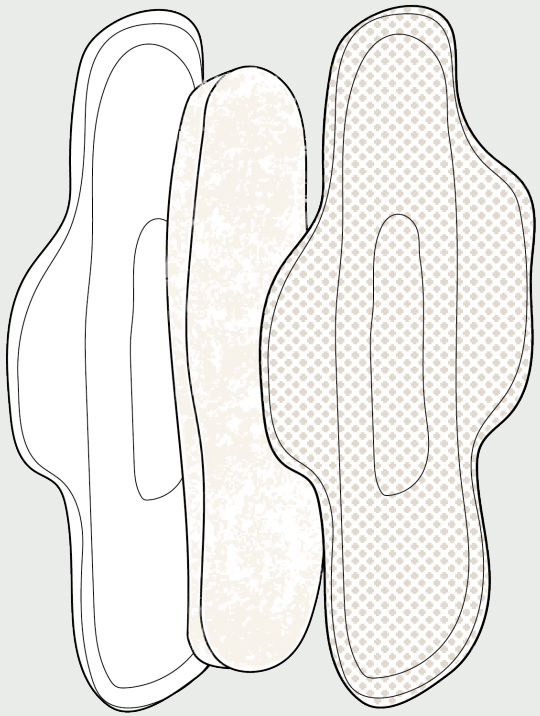
TODAY'S MATERIAL

Pine paper

The paper sheets consist of multiple layers of pine wood. The papers are produced in the United States and shipped to Aakar innovations who donated the material. The paper needs to be able to absorb all kinds of fludis and is a critical material for the pad.

Plastic bottom layer

The bottom layer in the pad consists of a non-biodegradable plastic material.



Nonwoven

The top layer in the pad consists of nonwoven, a textile material which consists of unstructured fibers. Parts of the fibers are polymetric, which makes them not biodegradable. Nonwoven is an effective material to use in a pad production, it lets the fluid into the absorbing material and is soft against the skin.

Gum

The gum consists of a glue which is mixed with half part of water. The mixture is sprayed on the pads in order for them to stick between the layers of plastic and nonwoven. Gum is also used for sticky papers for attaching the pads to the underwear.

Label papers

The papers have a matte side and a slippery one where the glue is added. They come in two different sizes for both the wings and the bottom of the pad.

Packaging bags

For the distribution of the pads, they are gathered in packages of eight. The packaging material is biodegradable and approved considering health aspects for the purpose of storing pads. However, there are consequences of using the biobags, they loose their resistance against bacterias and other particles over time. Also, it is not biodegradable in all environments, high temperature and pressure are needed which can only be established in an industrial environment.

RESEARCHED FUTURE MATERIALS

Eight requirements are presented to guide the research of a future absorbent material. These requirements eases the process of finding new materials for the project and also for the future if Zingira wants to change the absorbent material.

Requirements for absorbing material:

1. Absorb menstrual fluid
2. Hold 30-40 ml/pad
3. Retain menstrual fluid (except under pressure)
4. Distribute the fluid
5. Compressable
6. Keep shape after being compressed
7. Biocompostable
8. Local material

The absorbing material is a critical material due to all of the requirements. Polymers called superabsorbents are used in many pads to increase the absorbing ability. However, for a biocompostable pad polymers are not an option. During the project information has been gathered regarding choices for the absorbent material, these are presented below.

Bagasse & Bagasse + Pine paper

The residue of sugar cane is called bagasse which is a fibrous material. During the field study, the project group gathered bagasse for absorption tests in Sweden. The cost of the material is 5000 ksh for 1000 kilograms. The bagasse is more brittle and not as soft as the pine pulp and therefore needs to be mixed with another material or be further processed. Zingira tried pulverizing the bagasse and pressed the material into a pad, Arnnette described the pad as rough. In an interview with Jaydeep from Aakar Innovation, it was confirmed that bagasse can be used if the material got softer. In their production they used bagasse in a combination with pine paper, which made the fluff both soft and in a light brown color.

Banana fibre

Banana fiber can be used as an absorbing material. In multiple African countries pads are produced by banana fibre. The fibre can be pulverized and used as an absorbent. The disadvantage is that the process of making the fluff is time consuming and costly as the fibres need to be cleaned, dried and shredded before it can be turned into fluff (Biodegradable Sanitary Pads, 2020).

Banana fibre & Cotton

During the interview with Arnnette, she mentioned that Zingira has tried to use only cotton as the absorption material. The problem that occurred was that the hand pressing machine would not compress the material. It would also be more expensive to use in the production. Another solution is to combine the banana fibre with cotton. The banana fiber can be made into paper instead of fluff and cut into shapes of pads. The paper pads are covered in cotton which establishes the absorption material in the pad (Sanitary pads from banana fibre, 2015). The same disadvantage remains for the banana fibre though, the time consuming process to extract the fibre out of the banana stem.

Wood pulp: Airlaid paper

During an interview with Shamina, the founder of South African production for EACO pads, she mentioned that their absorption material consisted of wood pulp. The material consists of three layers, two pieces of airlaid papers that covers one SAP paper. The Airlaid paper is made out of wood pulp, a biodegradable plant fibre, certified by FSC (Forest Stewardship Council). The SAP paper consists of super absorbents, imported from the japanese company Sumitomo (EACO, 2020).

Kozo

During an interview with Hans, he recommended the plant kozo for the absorbing material. Kozo, or paper mulberry as it is also called, originally grows in Asia, but can be found in Africa. According to Hans, it is easy to process the material and to make paper out of it, the paper could later be pulverized into fluff.

MATERIAL WORKSHOP

ABSORPTION ABILITY

An absorption test was executed to compare the bagasse and nonwoven to the pine pulp.

According to Antal Boldizar, a Professor from the Department of Industrial and Materials Science at Chalmers University of Technology, the sugarcane waste, bagasse, had to be processed by pulverization to enable the absorption tests. As a consequence of Covid-19, the possibilities of visiting the institution Forest Industrial Chemical Engineering at Chalmers were limited. This is where the pulverizing of the material could be performed. Instead, the bagasse was processed in a homemade laboratory with an immersion blender. The three materials that took part in the tests were pulverized pine pulp, nonwoven residues from the ZingiPad production, and the bagasse.

Once the bagasse was processed the absorption tests started. First, eight grams of each material was measured and 330 grams of saline solution was added to each material. The saline solution consists of one part salt and 100 parts water. The material soaked in the liquid for one hour. Secondly, the saline solution from the containers was poured off and the materials, now soaked, were weighed. Lastly, pressure tests were performed through putting a 1.7 kilograms weight on each material and then weighing how much liquid that remained.

RESULT

	grams of water	times its weight	% water loss
BAGASSE	29	3.6	17
NONWOVEN	94	11.8	41
PINE PULP	123	15.4	36
	total absorption		pressure test

CONSLUSION

The test concludes that bagasse is not able to absorb close to as much as pine pulp in the state it was tried in. Jaydeep from Aakar Innovation expressed that bagasse was a good material to use for absorption but that it needs to be processed further and made into fluff by pulverization. To be able to absorb more the bagasse needs to be fluffed up to more of a cotton-like structure. The nonwoven has a similar absorption capacity as the pine fluff. However, the material includes plastic fibers that melted and gave the fluff a rough texture, which is not suitable for the pad.

MATERIAL WORKSHOP

KVARNBYNS HANDPAPPERSBRUK

To test the possibilities of making paper out of bagasse, Hans Assarsson at Kvarnbyns Handpappersbruk invited us to have a workshop. The purpose of the workshop was to both test the possibility of making bagasse paper and to see how the quality of the sheets varied when adding pine to the paper. The bagasse was put in a small Hollander beater, a machine that processes the material into smaller fibers together with water. The processed bagasse is later put in a water container where a mold screen is dipped into the water and gathers the bagasse mass. With tilted movements, the mass is spread on the screen and is either dried directly on the screen or transferred on a cloth. Adding pine into the container with the bagasse mass gave insights in proportions of bagasse and pine to eventually suggest to Zingira as future absorbing material in the pads.

The procedure of making paper out of bagasse:

1. Soak the bagasse in water.
2. Add Sodium carbonate (Na_2CO_3). The amount depends on the amount of dried material, 20% of the material's weight is added.
3. Boil mixture for 1 hour.
4. Rinse the bagasse until it reaches pH 7. Test the pH value with a measuring stick.
5. Put the material in the Hollander Beater, fill up with water. Add linseed oil if it froths.
6. Run the Hollander for 15-20 minutes.
7. Empty content in a bucket and rinse it through a cloth to remove the parts of the material that is too small.
8. Put the bagasse pulp in a tub together with water.
9. Make paper; collect the liquid with the mould screen, then press and dry.

The workshop was successful and resulted in both paper sheets made solely out of bagasse and sheets with a mixture of bagasse and pine. Unfortunately, the step involving chemicals can not be applied at Zingira. The chemicals could not be taken care of in an appropriate way in sewage systems in Kenya. This way of processing the fibers can be used if there is a way to execute it without using the chemicals.

MATERIAL LIST

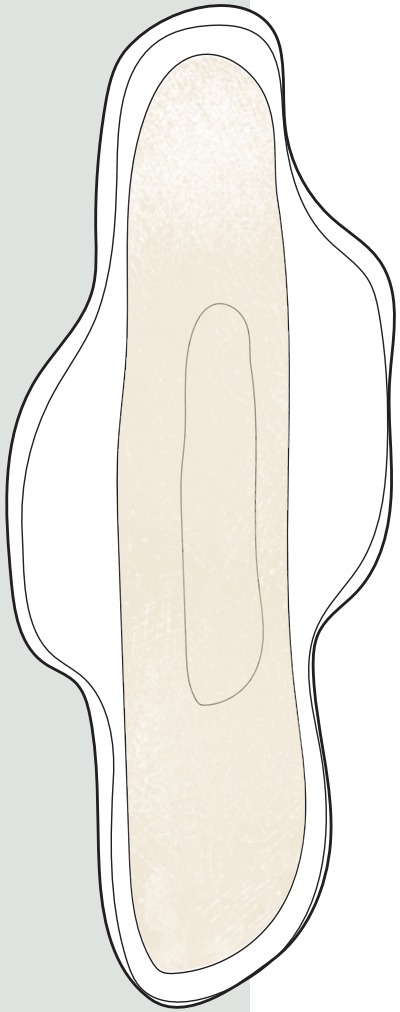
COMPARISON WITH REQUIREMENTS

In the table, the new materials have been listed and compared to each other and with the material attributes. These are assumptions made during the project and based on the gathered information from both research and interviews. Many of the materials are time consuming to process into paper and fluff, which makes them expensive to manufacture.

Identified materials

Material / requirement	Absorbing	Bio-degradable	Local accessability	Cheap to purchase	Cheap to manufacture	Soft material	Used by other manufacturers
Bagasse	○	○	○	○	●	●	●
Bagasse & pine paper	○	○	○	○	●	○	○
Banana fiber	○	○	○	○	●	○	○
Cotton & Banana fiber	○	○	●	●	●	○	○
Airlaid & SAP paper	○	●	●	●	●	○	○
Kozo	○	○	●	–	●	○	●

CONCLUSION



The results from the material theme indicated that there are possibilities of adding other plant fibers to the absorbent. Although Zingira discussed that a brown colored pad has not been appreciated in former occasions by customers. Instead, a proposal mixing the pine paper with another plant fiber was suggested. The result is a light brown colored pad, and if Zingira would emphasize that the pad is produced by local nature material, it would be easier for the customers to accept the product.

The disadvantage of using plant material is that it will start to biodegrade at a certain time. It is normal for bagasse products to start to biodegrade within 90 days (Biopla, 2020). This indicates that the pads could not be stored for a long time. Further, quality controls need to be done to ensure that the pads would not start to biodegrade earlier than what is normal for bagasse products. Involving chemicals could expand the number of days before the biodegrading process starts. Due to the sewage system in Kenya, chemicals are not an option, the water can not be purified by the toxins in the chemicals. Therefore, the material can only be boiled in plain water without chemicals.

Currently, bagasse seems to be the most appropriate plant material. Bagasse is both cheap, local, and soft if it is processed accurately and mixed with pine paper. Aakar Innovations has used bagasse as an absorbing material in pads before, and according to Jaydeep, the material's absorption is good. Kozo could also be an alternative if it is easily accessible in Kenya, according to Hans it would be easier to process and the material has similar absorbing properties as bagasse. The disadvantages of using kozo are the lack of knowledge regarding accessibility and price in Kenya.

To produce the absorbent material, the plant material needs to be processed in a Hollander beater. Zingira has access to a Hollander beater, but it requires repairing. After processing the material the mass has to be dried. Either by making paper with the water container and the mold screen or just spread out the mass by hand and let it dry in the sun, according to Hans. Although the spreading needs to be thin and even for the pulverizing machine to work.

For Zingira to start using the material they must first pulverize the bagasse paper together with pine paper and check the absorbency of the mixture. If the material is absorbing, a toxicity test should be performed to see if the skin would get irritated by the materials. If the bagasse is free from toxins, has good absorbing properties, and is approved by the customers, pads can start being produced. A questionnaire has been developed together with Zingira to get customer feedback on the pads appendix 6.

EDUCATIOIN

INTRODUCTION

As a response to the taboo regarding menstruation and menstrual health in Kenya, Zingira arranges educational events at schools to educate children. The ages of the children who are educated range between 8-18 years old and includes both boys and girls. The events are held by Zingira's social team which consists of seven people including one professional counselor and a nurse. Zingira base their educational material on a cirriculum provided by Aakar Innovations. The purpose of the awareness education is to spread knowledge regarding menstrual health and work against its taboo.

AIM

The aim of the development for Zingira's menstrual awareness program is to create a tool or activity that can be used as a complement to their educational program.

TODAY'S PROGRAM

Today Zingira's Menstrual Awareness Program refers to different topics that are relevant for the school children. The topics are life skills, gender equality, sexual and reproductive health, and menstrual health. Each topic is taught through lectures along with educational playful activities. The education is based on a curriculum that was provided by Aakar Innovations and later adapted to fit the local context of Kenya.

After gathering information about the program and reviewing the curriculum, areas for improvement were discussed with the social team at Zingira. Zingira requested something that would make the education more interactive and make learning less dependent on lectures. Therefore, a tool that enables learning through interactive and informative play was developed.

REQUIREMENTS LIST

Required product attributes

- Affordable
- Easy to produce
- Materials or tools should be adaptable to different ages
- Easy to understand for teachers and students
- Enable repetition from lectures
- Activity/tool should be fun to use for the students
- An interactive activity/tool that integrates learning through play

Desirable product attributes

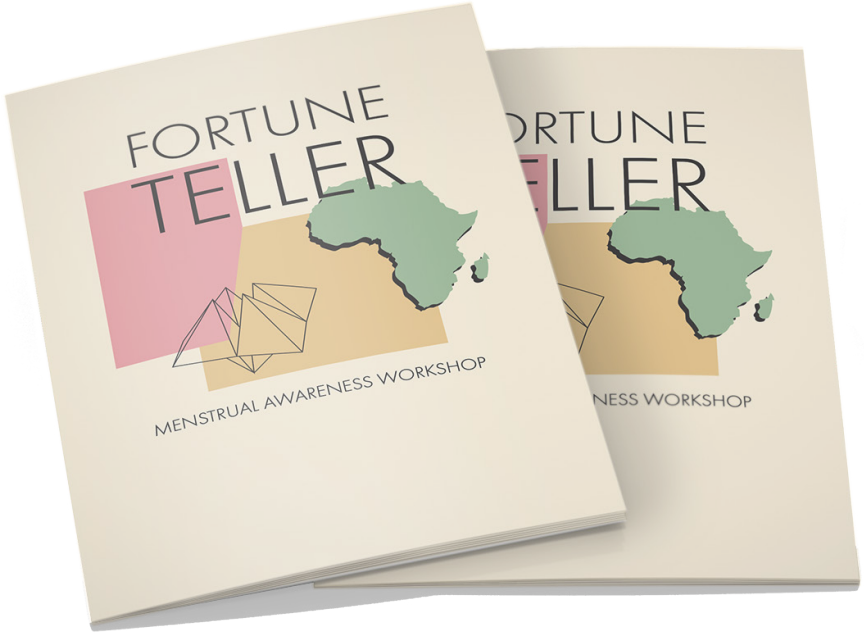
- Activity/tool should provide value over time
- Foster creativity
- Adaptable for different age groups

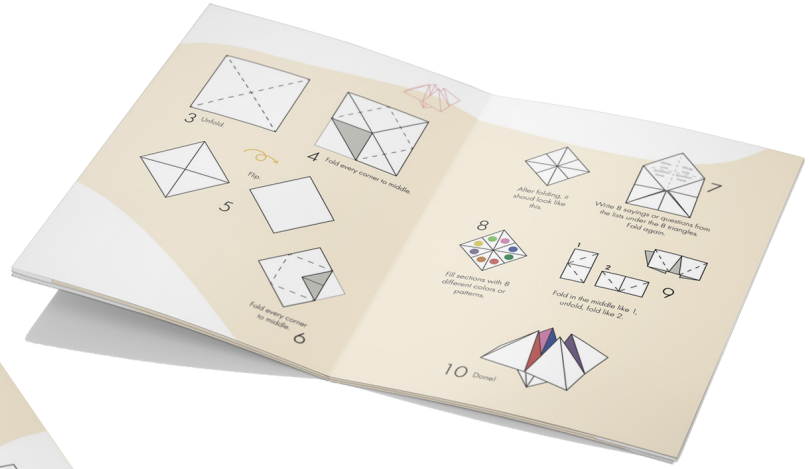
FORTUNE TELLER ACTIVITY

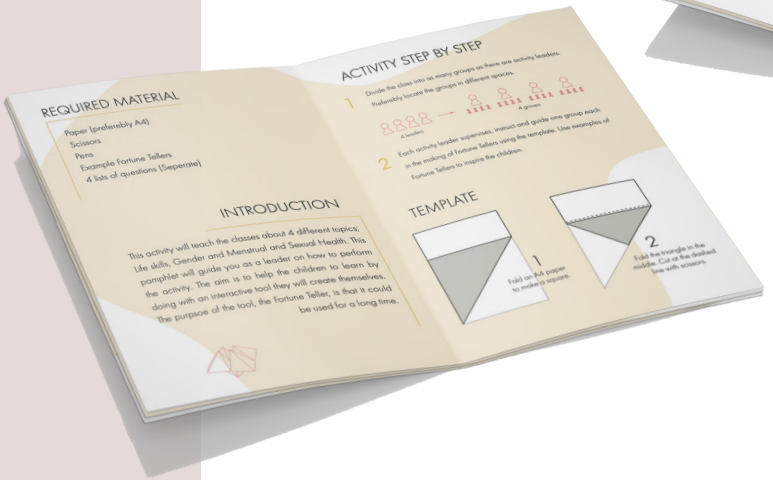
The final concept is an activity based on paper fortune tellers. In the fortune tellers questions and statements will be written regarding the topics talked about in the curriculum: Life skills, Gender, Menstrual and Sexual health.

The purpose of the activity is to enable the children to learn about important and relevant topics through play and creativity. They will first be divided into smaller groups where they are guided in creating their own fortune teller. Each group will use different lists of questions from all four topics. When they are done building their fortune tellers they will play together with the other groups. This will enable the children to learn from each other during play. After the play they return to their initial group and discuss what they learned. The discussion enables the children to reflect over and learn from the activity. Finally, the children bring their fortune tellers home where they can continue learning and playing with friends and family. The concept aims at spreading knowledge on the topics not only in the schools but also in the surrounding communities.

The social team at Zingira will be provided with an activity guide that will instruct them on how to arrange the activity. They will also be provided with eight question sheets where four of them contain questions that are relevant for the ages 8-13 and four question sheets aimed at the age group 14-18 years old. The categorization of questions was important as Zingira has educational events with both children and young adults.







LIST WITH QUESTIONS - Sheet 4

Age 14 -18

Zingira Fortune Teller Workshop

LIFE SKILLS

Why is it good to say positive things to others?
Answer: You become better friends and they become happy.

What makes you a good friend?

Is it OK to talk about your feelings?
Answer: Yes, it is important

GENDER

Say a situation where you was treated differently because of your gender?

Can girls and boys work with the same things?
Answer: Yes

MENSTRUAL HEALTH

Where do you throw used pads?
Answer: Wrap in paper and throw in a bin.

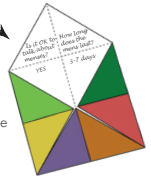
Is menstruation dangerous?
Answer: No, it is natural

What are menstrual cramps?
Answer: Cramps in the stomach before you get your period.
(not dangerous)

SEXUAL HEALTH

What are the major sex organs that produce eggs?
Answer: Ovaries

What do you need to consider before having sex?
A. Feeling safe
B. Mutual consent.
C. Safe sex
D. All of the above (the right answer)



Write your questions here

LIST WITH QUESTIONS - Sheet 3

Age 8-13

Zingira Fortune Teller Workshop

LIFE SKILLS

What does a good friend do?

What do you want to be when you grow up?

GENDER

Can both boys and girls play sports?
Answer: Yes

Is it ok to treat someone different because they are a boy/girl?
Answer: No.

MENSTRUAL HEALTH

Can boys have menses?
Answer: No

Say a feminine care product
Answer: Pad, Tampon, Menstruation cup

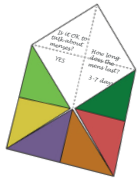
Is it OK to talk about menses?
Answer: Yes

Can you play during menstruation?
Answer: Yes

SEXUAL HEALTH

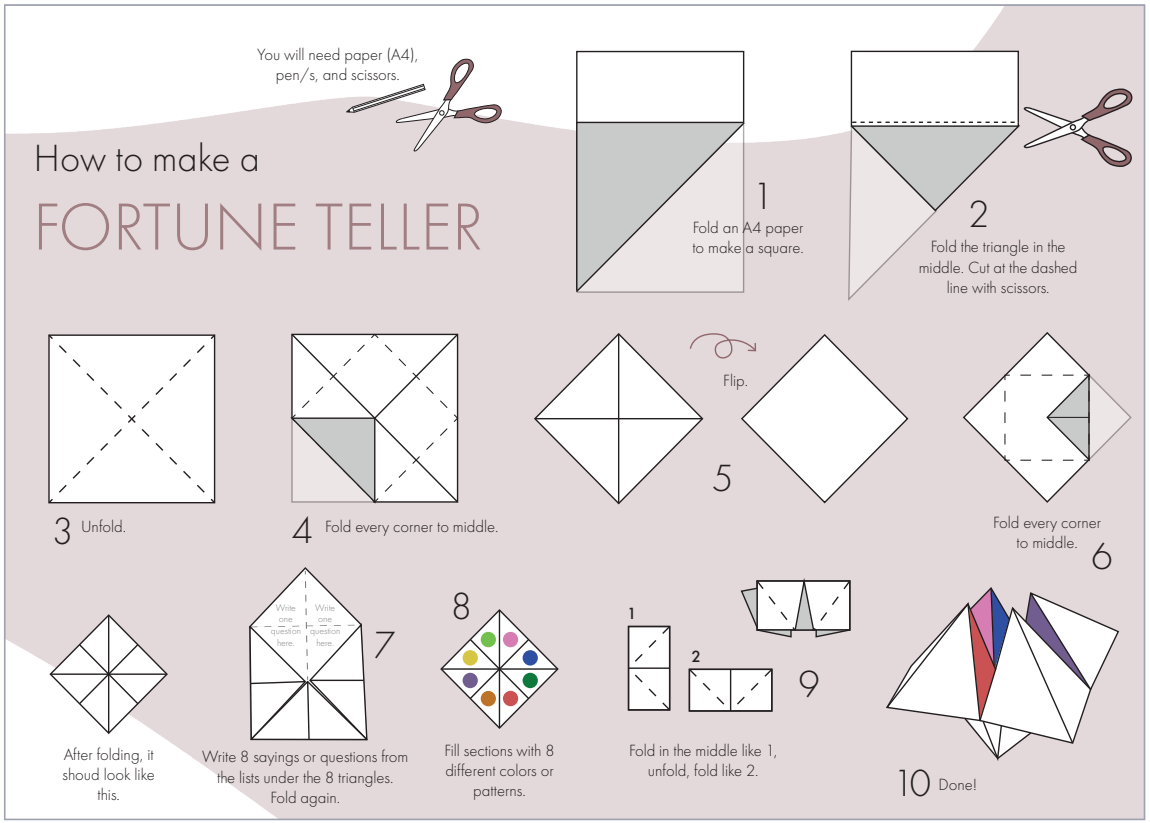
How does a boys body change during puberty?
Answer: Voice changes, penis and testicles grow, facial, body, pubic hair appears

Do all vaginas look the same?
Answer: No, all are different and all shapes are good



Write your questions here

How to make a fortune teller guide and aged based question sheets for the acivity.

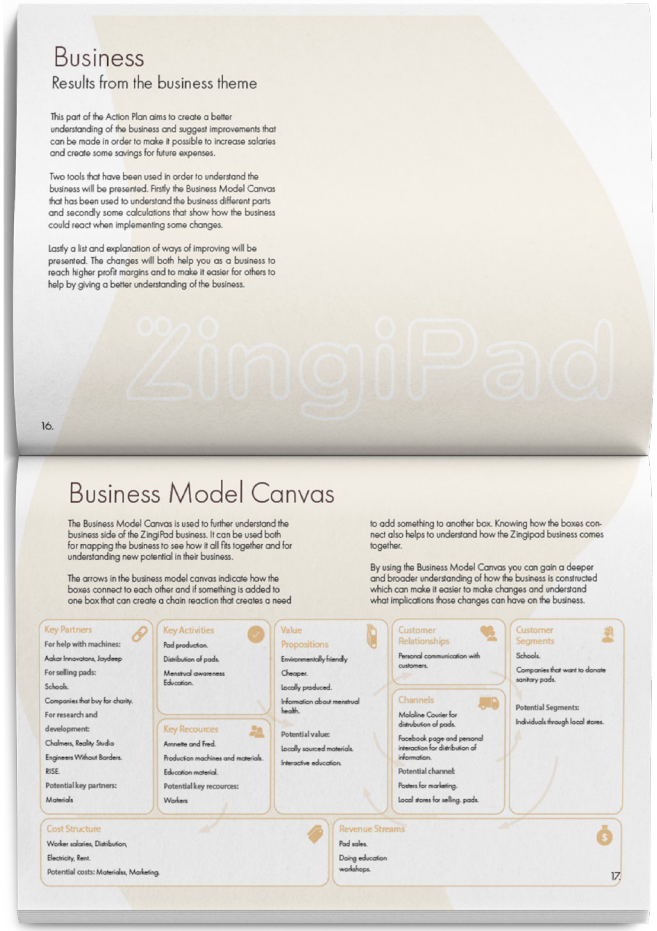


ACTION PLAN

An action plan was made to communicate the resuls of the project to Zingira, in order for them to be able to implement the presented solutions.

The action plan contains instructions on how to implement solutions from all four themes considered in the project: Education, Production, Materials & Business.

Four activity lists, one for each theme, is included in the action plan. This describes in what order activities should be performed. The total number of spreads in the action plan are eleven, and four of these are presented to give an idea of how the solutions are communicated.



Business

Results from the business theme

This part of the Action Plan aims to create a better understanding of the business and suggest improvements that can be made in order to make it possible to increase salaries and create some savings for future expenses.

Two tools that have been used in order to understand the business will be presented. Firstly the Business Model Canvas that has been used to understand the business different parts and secondly some calculations that show how the business could react when implementing some changes.

Lastly a list and explanation of ways of improving will be presented. The changes will both help you as a business to reach higher profit margins and to make it easier for others to help by giving a better understanding of the business.

ZingiPad

16.

Business Model Canvas

The Business Model Canvas is used to further understand the business side of the ZingiPad business. It can be used both for mapping the business to see how it all fits together and for understanding new potential in their business.

The arrows in the business model canvas indicate how the boxes connect to each other and if something is added to one box that can create a chain reaction that creates a need to add something to another box. Knowing how the boxes connect also helps to understand how the Zingipad business comes together.

By using the Business Model Canvas you can gain a deeper and broader understanding of how the business is constructed which can make it easier to make changes and understand what implications those changes can have on the business.

Key Partners
For help with machines:
Aakar Innovators, Joydeep
For selling pads:
Schools.
Companies that buy for charity.
For research and development:
Chalmers, Reality Studio
Engineers Without Borders.
RISE.
Potential key partners:
Materials

Key Activities
Pad production.
Distribution of pads.
Menstrual awareness Education.

Key Recources
Annette and Fred.
Production machines and materials.
Education material.
Potential key recources:
Workers

Value Propositions
Environmentally friendly
Cheaper.
Locally produced.
Information about menstrual health.
Potential value:
Locally sourced materials.
Interactive education.

Customer Relationships
Personal communication with customers.

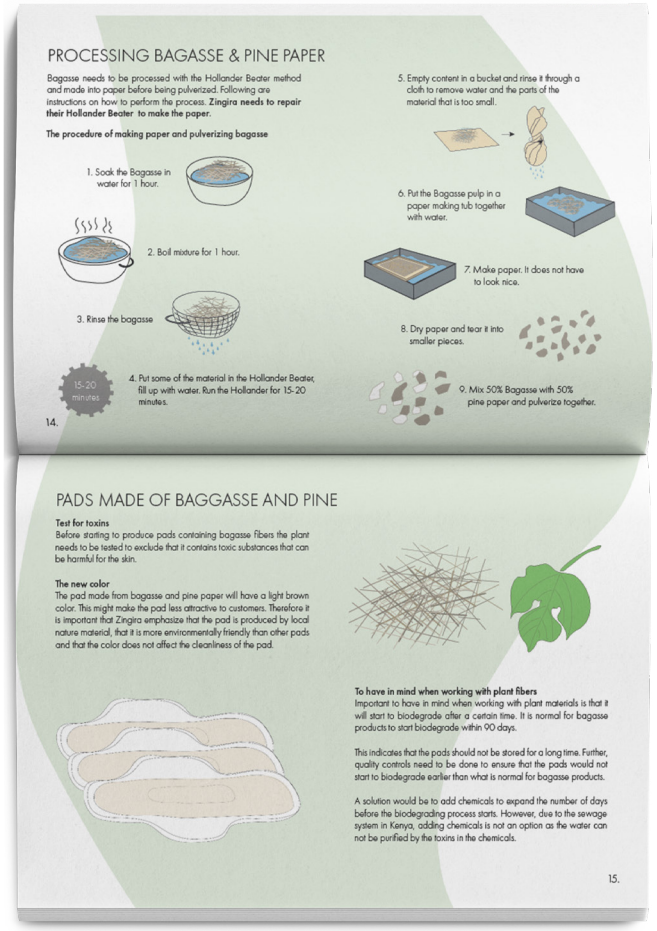
Channels
Maloline Courier for distribution of pads.
Facebook page and personal interaction for distribution of information.
Potential channel:
Posters for marketing.
Local stores for selling. pads.

Customer Segments
Schools.
Companies that want to donate sanitary pads.
Potential Segments:
Individuals through local stores.

Cost Structure
Worker salaries, Distribution,
Electricity, Rent.
Potential costs: Materials, Marketing.

Revenue Streams
Pad sales.
Doing education workshops.

17.



PROCESSING BAGASSE & PINE PAPER

Bagasse needs to be processed with the Hollander Beater method and made into paper before being pulverized. Following are instructions on how to perform the process. **Zingira needs to repair their Hollander Beater to make the paper.**

The procedure of making paper and pulverizing bagasse

1. Soak the Bagasse in water for 1 hour.
2. Boil mixture for 1 hour.
3. Rinse the bagasse
4. Put some of the material in the Hollander Beater, fill up with water. Run the Hollander for 15-20 minutes.
5. Empty content in a bucket and rinse it through a cloth to remove water and the parts of the material that is too small.
6. Put the Bagasse pulp in a paper making tub together with water.
7. Make paper. It does not have to look nice.
8. Dry paper and tear it into smaller pieces.
9. Mix 50% Bagasse with 50% pine paper and pulverize together.

15-20 minutes

14.

PADS MADE OF BAGGASSE AND PINE

Test for toxins
Before starting to produce pads containing bagasse fibers the plant needs to be tested to exclude that it contains toxic substances that can be harmful for the skin.

The new color
The pad made from bagasse and pine paper will have a light brown color. This might make the pad less attractive to customers. Therefore it is important that Zingira emphasize that the pad is produced by local nature material, that it is more environmentally friendly than other pads and that the color does not affect the cleanliness of the pad.

To have in mind when working with plant fibers
Important to have in mind when working with plant materials is that it will start to biodegrade after a certain time. It is normal for bagasse products to start biodegrade within 90 days.

This indicates that the pads should not be stored for a long time. Further, quality controls need to be done to ensure that the pads would not start to biodegrade earlier than what is normal for bagasse products.

A solution would be to add chemicals to expand the number of days before the biodegrading process starts. However, due to the sewage system in Kenya, adding chemicals is not an option as the water can not be purified by the toxins in the chemicals.

15.

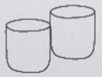
HOW TO PERFORM AN ABSORPTION TEST

An absorption test can be made to compare the absorption of different absorbing materials in the Zingipad.

It can also be used to test if spraying gum on two sides of the pressed pulp will affect the absorption of the pad.

THIS IS WHAT YOU NEED TO PERFORM A TEST:

Paper towels

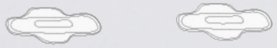


Two cups that measure around 20ml.

A container with dyed water. It can be any color.

How to perform a generall absorpation test to compare the absorption of two materials.

1. Produce two pads. One with material X and one with mateiral Y. Material X could for example be a bagasse pad and material Y could be pine paper.



Material X Material Y

2. Place the pads on two paper towels.

3. Pour 20ml of the colored water in the middle of each pad.

4. After pouring the water onto the pad. Wait for one minute and then control if there has been any leakage onto the paper towel.

5. If there has been no leakage: pour 20ml colored water on the pads again.

5. Wait for one minute and control again if the paper towels has been stained. If there are no stains: Repeat step 5.

The first pad to stain the paper towel has the lowest absorption capacity. In this test material X has the lowest absorbing capacity.

Material X Material Y

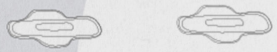
If the water has stained the paper towel the pad has reached its **total absorption.**

TEST IF THE GUMMING GRID METHOD AFFECT THE ABSORPTION OF THE PAD

Perform the absorption test where:

Material X = Pad with pulp sprayed on one side.

Material Y = Pad with pulp sprayed on two sides.



Material X Material Y

If the pad with material Y stains the paper towel first the absorption is affected. To fix that, more pine pulp can be added to the pad to make up for lost absorption.

Education

Introduce activity to Social Team and adapting to context.

1. Activity walkthrough with Social Team

Do a walkthrough of the activity using the Fortune Teller Activity manual. Test the activity with the team and fold a few fortune tellers that later can be used as examples.

2. Test and evaluate activity with children

Let the Social Team test the activity together with a smaller group of children. It is good if there are children of different ages, between 8-18 years old.

Take notes during the activity:
- What works well?
- What does not work?
- What changes need to be done to the activity?

3. Evaluate activity test

After testing the activity with the children it is important to evaluate the outcome together with the Social Team.

Discuss your notes.
- What worked and not?
- What changes needs to be done?

Decide on a final strategy for how you will perform the activity in the schools.

Education

Bringing the Fortune Teller activity to school

1. Preparing the event

Before performing an educational activity, let the teachers on the school know what materials are needed for the activity.

Prepare to bring following materials to the event:

If the school does not have sicssors, pens or paper it is goot to bring it.

Bring one Fortune Teller Activity Guide for each leader.

4-8 Instruction sheets

Bring 8 question sheets: 4 sheets for the age 8-13 and 14-18.

3. Perform activity at school

Use the instruction manual to perform the event at the school. Take notes during the event.

- What works well?
- What does not work?
- What needs changing?

4. Evaluate the activity outcome

Discuss your notes. Does anything need to change? Make changes to the activity.

DISCUSSION

Production

The solutions were developed to fit the requirements and needs of the workers at Zingira. The solutions are materials and tools that made to fit the context. Early in the project, the project team decided to develop solutions that could be easily implemented instead of bigger constructions that would be too expensive and complex for the organization to assemble. The project focused on involving Zingira in the developing process to create a sense of ownership of the solutions. The solutions presented regarding the production of ZingiPads have the potential of increasing production efficiency and creating a more sustainable economic situation. The solutions will also make it easier for the production team to produce pads and to teach new workers to perform tasks. With increased efficiency, Zingira will be able to provide more girls with affordable pads which will create more equal opportunities for girls in Kenya.

Business

The mapping of the business surrounding the Zingipad will create a greater understanding of the economical and organizational aspects of the business within the Zingira management team. The mapping of the economics will make it easier for Zingira to calculate costs for the production and salaries as well as seeing how changes in their organization can affect profitability. Further, the mapping also includes future business opportunities, which can be used to inspire Zingira in the development of Zingipad. The business situation was a challenge for the project team due to the difficulties in understanding the current situation. There was not a lot of numeric data and the data was difficult to understand. Money can also be a sensitive subject to talk about which made it harder to dive deep in the subjects in interviews.

Material

In the beginning of the field study, the project team aimed to find new materials. Since the field study was canceled abruptly, there was a struggle to find local materials in the remaining time. In Sweden, there was limited access to Chalmers material testing labs, due to Covid-19. The project was limited to testing only one local material which was brought from Kenya. The identification and testing of future absorbing materials for the pad will work as guidelines for Zingira when they start looking for future materials. They will have more knowledge of the material attributes and the requirements for processing and manufacturing, which will make it easier for them when they start considering their options. Further, the materials identified are biodegradable or compostable which aligns with Zingiras vision of developing an environmentally friendly pad.

Education

The potential impact the fortune teller activity will have on Zingira's Menstrual Awareness Program is that it will make it easier for the social team to engage the children in learning about the topics. As the fortune teller activity involves crafts, creativity, and play, the learning process will be less dependent on the regular lectures. The knowledge will be presented in a way that is more adapted to the children's prerequisites. Further, as the children will keep their creations, the play can continue at home and create a chain reaction where the knowledge is spread to their siblings, parents, and friends. To evaluate the instructions for the fortune teller multiple users were involved. Both Arnnette and Evace tried making the fortune teller and they also involved their children of the ages six-nine. The feedback received was that the instructions were not clear enough if you have never folded a fortune teller before. Modifications of the instructions and further testing were done, with one 25 year old and one six year old. After that evaluation final changes were made to the instructions and the final design was set.

How the different themes impact each other

If the production would improve it would affect both the business and the education. With a more efficient production, Zingira could sell more pads and have more education opportunities in the local schools. If the production would be effective and more profitable Zingira could expand their business and employ more workers. The production and their brand are affected by the materials. If the material runs out, the production would have to be canceled, and if they keep on using eco-friendly materials they can still use it as a selling point. By following the action plan and thereby the results established in each theme of the project Zingira will be able to develop as an organization. Since the four themes are connected, one change makes the whole organization take one step in the right direction. Though, changes in all of the four themes are necessary to fulfill the aim of reaching more young girls with sanitary pads and knowledge about menstrual health.

The affection of the Covid-19 pandemic

The main challenges within the project are connected to the Covid-19 pandemic. As mentioned in the introduction Chalmers had to cancel the field trip early because of the pandemic. The effect of this event was that a lot of time together with stakeholders was lost. Fortunately, essential interviews and workshops could be held before it was time to leave Kenya. The information that was gathered could thereafter form a starting point for the project. Back in Sweden, the project definition had to be adapted after the new circumstances. However, because of the amount of gathered data the changes were manageable. Also, because Zingira is a central part of the course, communication could continue relatively well despite the distance. The downside is that it was harder to co-create, evaluate, and implement the solutions together with the stakeholders. A lot more responsibility is instead put on the stakeholders and they have to implement the provided solutions by themselves. To make this task easier a detailed action plan was made where step by step instructions for implementing the solutions are described.

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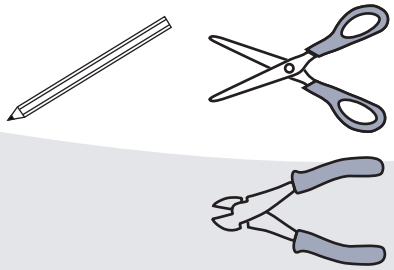
INTERVIEWED PEOPLE

NAME	ORGANIZATION	ROLE
Arnnette Okeyo	Zingira	Head of pad manufacturing,
Evance Odhiambo	Zingira	Manager
Antal Boldizar	Chalmers University of Technology	Professor from the Department of Industrial and Materials Science
Sara Pettersson	Former student at HDK	Worked with Zingira
Magdalena Hörle	Essity	Product developer, feminine care.
Shamima	EACO	Received the same materials and machines from Aakar Innovations as Zingira did in 2016 and they are producing pads in South Africa.
Jaydeep Mandal	Aakar Innovations	Pad production in India, donated material to Zingira.
Hans Assarsson	Kvarnbyns Handpappersbruk	Paper making expert. Previously worked with Zingira.
Bertil Mark	Kvarnbyns Handpappersbruk	Paper making expert. Previously worked with Zingira and JaniPad.

APPENDIX 1

How to make a

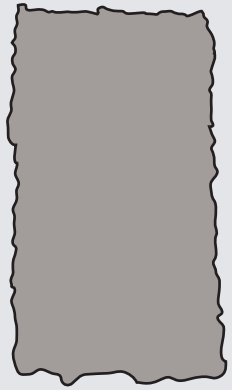
TEARING POSTER



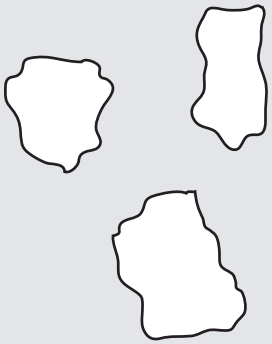
Follwing tools can be used.

12 inches

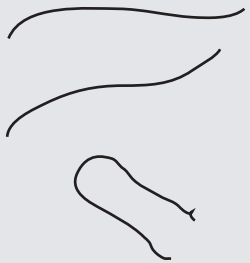
20 inches



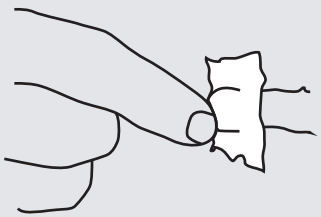
Tear apollo paper into poster size.



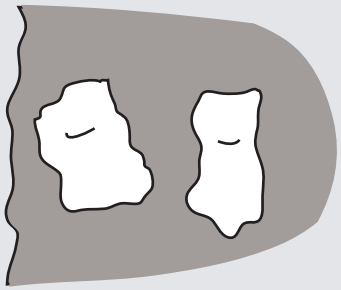
Tear pieces of pine Paper, Both OK and Not OK.



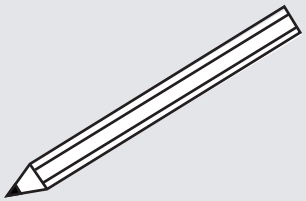
Cut strings of steele wire into 3 inches pieces and bend them like above.



Pierce steele wire through the pine paper.



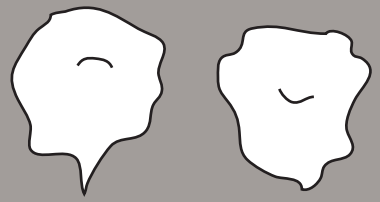
Attatch pinepaper to the poster.



Write according to the guide on the poster to the right.

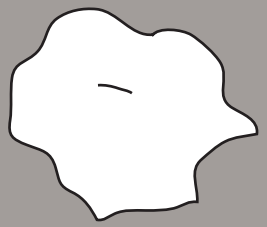
TEARING GUIDE

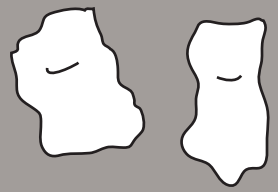
SIZE & THICKNESS



OK size and thickness.

A bit bigger size but **OK** because it is thin.

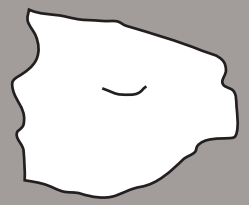




Thick but **OK** because they are small.

NOT OK

Too big to be this thick.

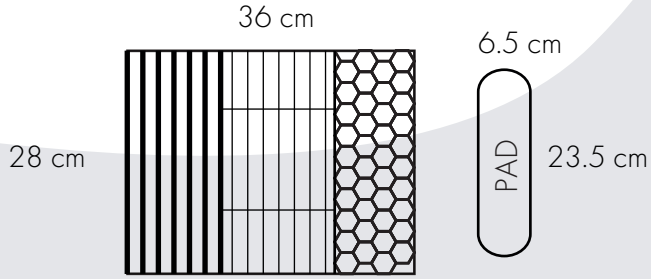


Thickness ok but it is too big.

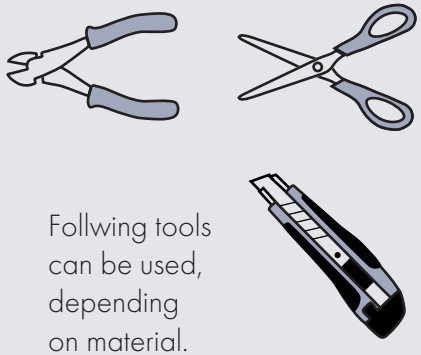
APPENDIX 2

How to make and use a

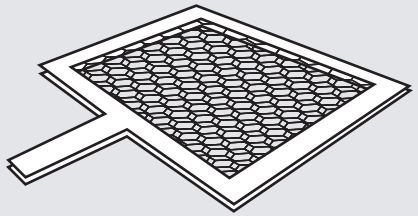
GUMMING GRID



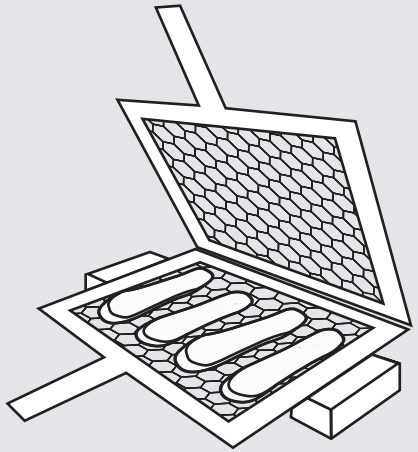
Choose one grid material, make a frame if the grid is not sturdy enough. Steele or wood is recomended, since the frame needs to be cleaned.



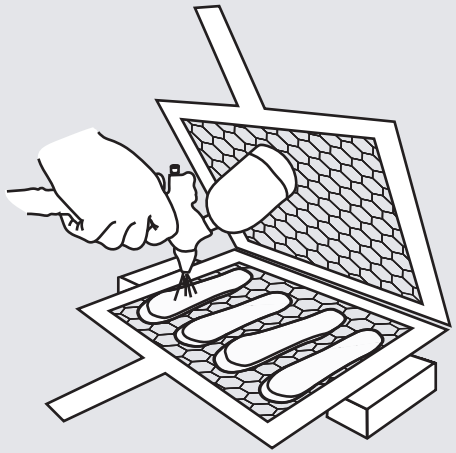
Follwing tools can be used, depending on material.



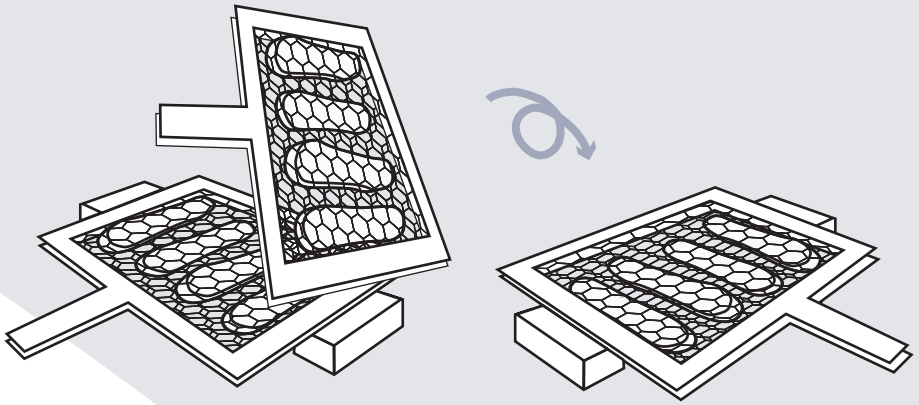
Manufacture the gumming grid. Connect the grid to a frame and add a handle



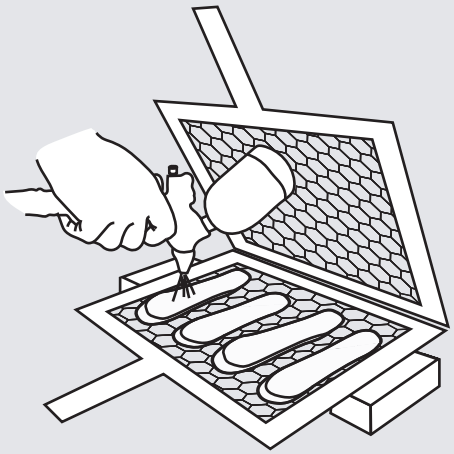
Place the pads on the inside of the grid. Put two supports below the grid, for the pads to stay clean.



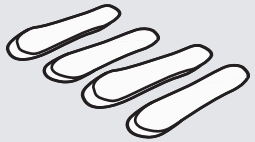
Spray the pads with the glue gun.



Flip the grid 180 degrees



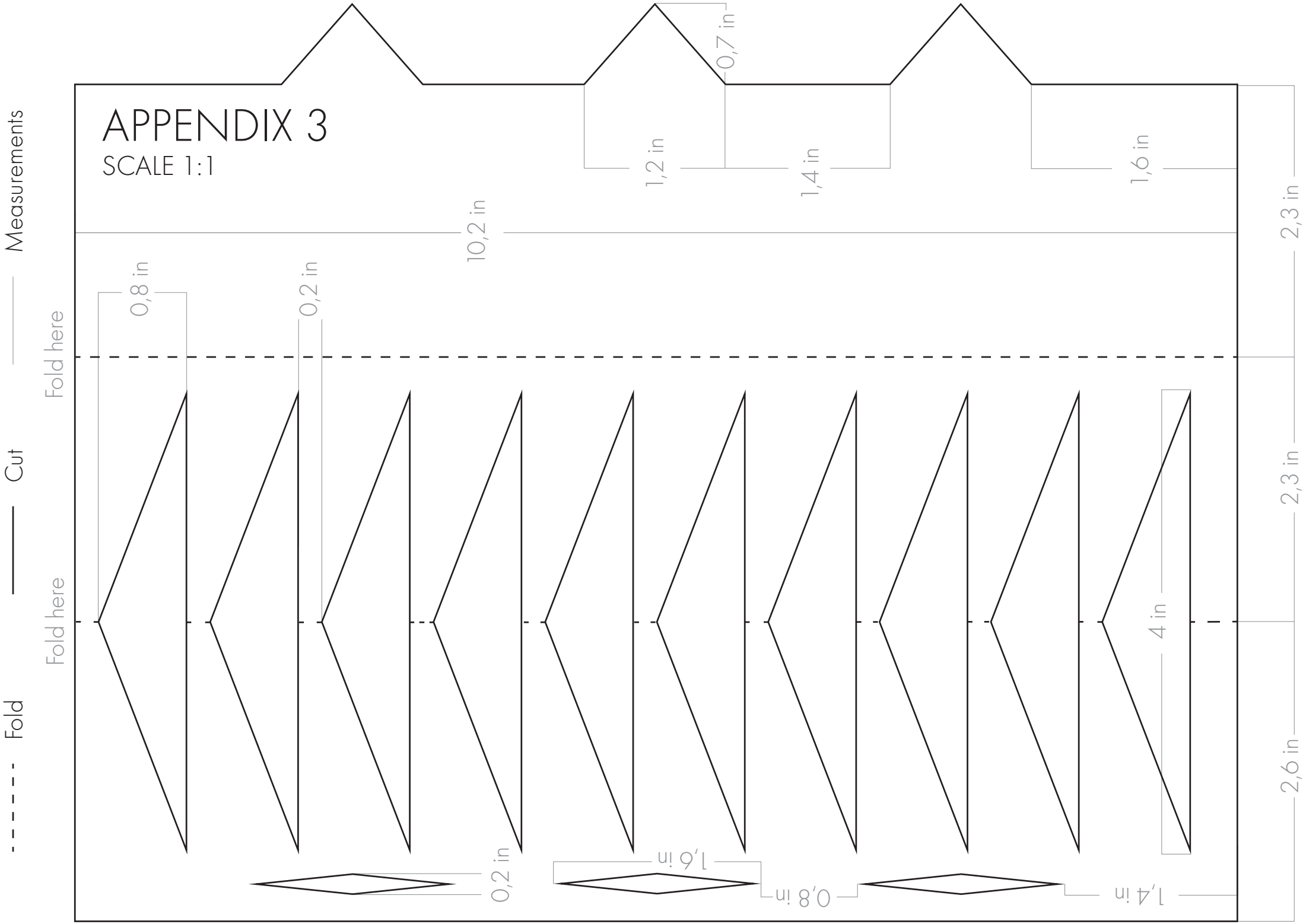
Spray the pads on the other side



Place the finished pads in the sealing machine

APPENDIX 3

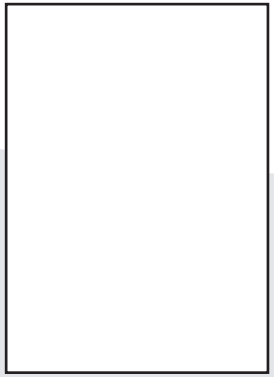
SCALE 1:1



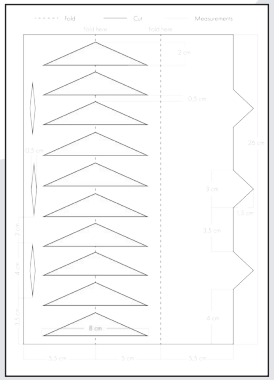
APPENDIX 4

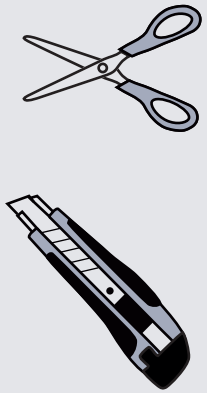
How to make a

PAD STAND

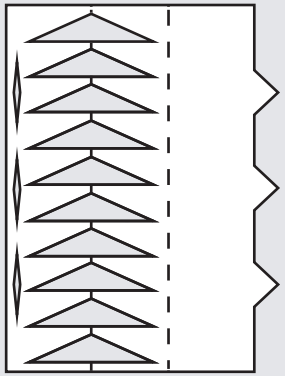


Use a piece of card board or a thicker paper.

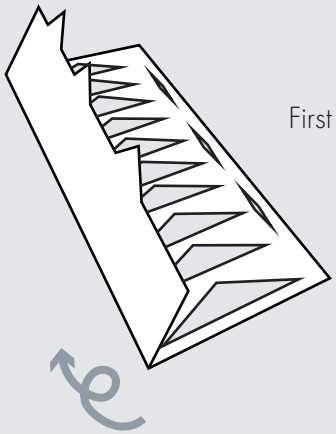




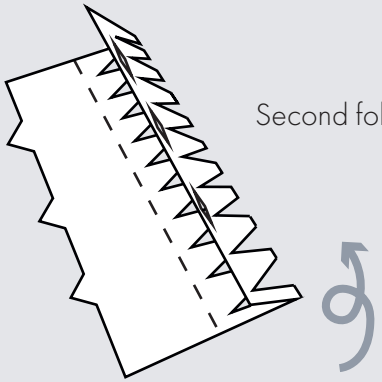
Cut the outer lines on the template, use either a scissor or a razor knife depending on the material.



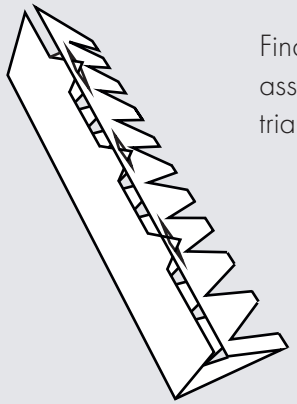
Cut the triangular holes and fold at dashed line.



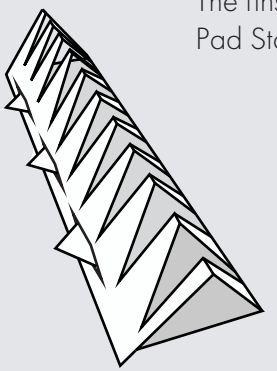
First folding.



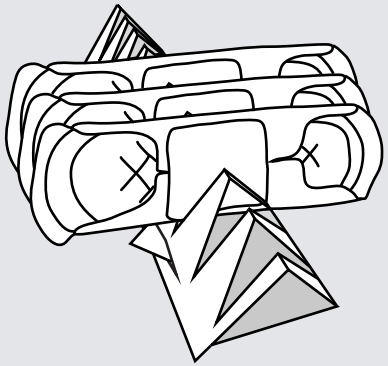
Second folding.



Final folding, assemble the triangle.



The finsihed Pad Stand.



APPENDIX 5

Cost

The key information regarding costs comes from Evance. These are:

- Approximately 0,2 ksh per pad for electricity.
- ZingiPad pad 60 procent of the 30 000 ksh rent which equals 18 000 ksh.
- Distribution cost is 140 ksh for every 100 packs.
- Material costs have not been accounted since ZingiPad does not pay for materials but it is a potential cost in the future.

Time

The time calculations presented are not seen as a true reflection of the reality. The times are based on the data we collected from workshops, and times that we received from Zingira. The data has been sufficient in understanding the business and understanding what different changes can make to the business.

Further data is needed to create more accurate calculations and predictions to improve the current situation.

Times based on data from workshops with Zingira and from times and volumes provided by Evance and Arnnette.

Activites	Time per pad
Tearing	90 seconds
Pulverize, weigh, spread, stamp	96 seconds
Gum, seal, quality, gum	54 seconds
Dry	8 - 12 hours
Steralize	24 minutes

Semi inactive time. The steralizer needs to be filled.

Inactive time.

Times used with a production amount (600) that they can make in a couple of days being two people.

Number of pads	600
Tearing	900 minutes
Pulverize, weigh, spread, stamp	960 minutes
Gum, seal, quality, gum	540 minutes
Dry	12 hours
Steralize	24 minutes

Working time for 600 pads and one person:
Tearing + Pulverize... + Gum, seal... + Pack
900 + 960 + 540 + 160 + 24 = 2 584 min

It takes approximately **43** hours for one worker to make 600 pads not counting drying.

Halving the time for tearing because of the use of the jack plane.

Number of pads	600
Tearing	450 minutes
Pulverize, weigh, spread, stamp	960 minutes
Gum, seal, quality, gum	540 minutes
Dry	12 hours
Steralize	24 minutes

Working time for 600 pads and one person:
Tearing + Pulverize... + Gum, seal... + Pack
450 + 960 + 540 + 160 + 24 = 2 134 min

It takes approximately **35,6** hours for one worker to make 600 pads not counting drying.

APPENDIX 6

ZingiPad

QUESTIONNAIRE

Costumer Evaluation Sheet. This will be used in the development of the pad brand ZingiPad.

FEELING

	Strongly disagree				Strongly agree	Don´t know
This pad feels good against my skin	☐	☐	☐	☐	☐	☐
I feel safe while wearing this pad	☐	☐	☐	☐	☐	☐
I know how often I should change the pad	☐	☐	☐	☐	☐	☐

APPEARANCE

	Strongly disagree				Strongly agree	Don´t know
The colour of the pad is appealing	☐	☐	☐	☐	☐	☐
The shape of the pad is appealing	☐	☐	☐	☐	☐	☐
I like the packaging of this product	☐	☐	☐	☐	☐	☐
I know who made these pads	☐	☐	☐	☐	☐	☐

FUNCTIONALLITY

	Strongly disagree				Strongly agree	Don´t know
This pad is absorbent enough	☐	☐	☐	☐	☐	☐
The pad has the correct position in my underwear	☐	☐	☐	☐	☐	☐
The attachment of the pad to the underwear is good	☐	☐	☐	☐	☐	☐
There are enough pads in one package	☐	☐	☐	☐	☐	☐
I prefer the whole length of the pad's backside to be sticky rather than 3 small areas	☐	☐	☐	☐	☐	☐
I use pads with the same absorbing capacity during the whole menstruation	☐	☐	☐	☐	☐	☐
I know how the pad should be disposed	☐	☐	☐	☐	☐	☐

ACCESSIBILITY

	Strongly disagree				Strongly agree	Don´t know
I can afford this pad	☐	☐	☐	☐	☐	☐
I know where I can buy these pads	☐	☐	☐	☐	☐	☐

COMMENTS _____