

Semester Project 02

Kopa

Menstrual Cup Sterilizer

Project Guide
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Submitted by
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Approval Sheet

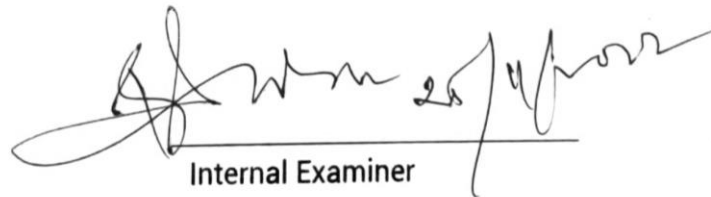
The Design Project II titled “Kopa” by Shivani Mule
Roll Number 216130002 is approved in partial fulfillment of the
Masters Degree (Industrial Design) at the
IDC School of Design, Indian Institute of Technology Bombay.

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Declaration

I declare that this project report submission contains my own ideas and work, and if any pre-existing idea or work has been included, I have adequately cited and referenced the original author(s). I also declare that I have adhered to all the principles of academic honesty and integrity and have not misinterpreted, fabricated or falsified any idea/ data/ fact source in my submission.

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November 2021

Abstract

Menstrual cups are a revolutionary product in women's menstrual health and hygiene sector. Being reusable and affordable, it is a sustainable solution for the sanitary waste being generated per woman per cycle. It is gaining popularity amongst the youth and working-class women but still, there is a huge number of women who are skeptical about it. Menstrual cups are also receiving a positive response from women in urban and rural areas as it is low cost and low-maintenance. Despite being a reformative product, certain issues have to be addressed to increase engagement and user numbers project deals with the development of understanding the issues with the process and developing a tangible product solution for the same.

Acknowledgment

This endeavor would have not been possible without the support of my family, friends & peers. This project involves intense user study and understanding for which I am grateful to the 120 women who participated in my study and extended their love and insights.

I would also like to thank Dr. Shweta Pagore Shinde for helping me understand the medical issues & psychological aspects of women's healthcare, and my project guide Prof. Purba Joshi to mentor me throughout the project.

I would like to extend my special thanks to Sanket Pai, and Dr. Madhura Shinde for helping me get direction for the project.

I also would love to thank my peers M.Hazique Kola, Aryan Gajwe, and Rahul R. for the technical guidance; Dishant Mehlawat for branding and Aditya Parekh for 3D visualization.

Table of Content

1. Introduction

1.1. Introduction to Menstrual Cup.....	2
1.2. Menstrual Cup & Sanitary waste.....	3
1.3. How to use Menstrual Cup	8
1.4. Material & Maintenance	10

2. Design Research Methodology.....13

3. User Study/ Primary Study

3.1. Demographics.....	16
3.2. Context study	17
3.3. Health & Hygiene.....	22
3.4. Survey & Analysis.....	23
3.5. User interviews.....	34
3.6. Mind mapping (Empathy)	36

4. Secondary Study

4.1. Methods of sterilization.....	38
4.2. Market Study	40
4.3. Product Analysis	43
4.4. Mind mapping (Product use)	48

5. Design Brief

5.1. User Persona	50
5.2. Problem Statement	51
5.3. Product Brief	52

6. Ideations

6.1. Stage 01	54
6.1.1. Form Style Board	55
6.1.2. Form Generation 01	56
6.1.3. Mechanism Generation 01... ..	57
6.1.4. Mock-up Rig analysis	59
6.2. Stage 02	60
6.2.1. Form Style Board	61
6.2.2. Ideation generation 02	62
6.2.3. Form Generation 02	64

7. Concept Development

7.1.1. Concept option01	66
7.1.2. Concept option02	68
7.1.3. Concept option 03	70
7.2.Comparative Analysis	72
7.3. Final Concept	73
7.3.2. Working rig	74
7.3.3. Mock-up	75
7.3.4. Surface development	76
7.3.5. Concept setbacks	77

8. Product Development

8.1. Electrical Circuit development	79
8.2. Revised Design Brief	80
8.3. Revised Concept	81
8.3. Style Board	84
8.4. Final Renders.....	85
8.5. Product Pictures.....	88

Table of Content

9. Challenges & Learnings86

10. Miscellaneous

 Brand Identity88

11. Appendix

 Consent form90

Reference92

List of Figures

Fig.1. Menstrual Cup.....	2
Fig.2. Figure of sanitary waste generated.....	3
Fig. 03. Sanitary Waste.....	4
Diagram .01. Global Waste disposal.....	5
Fig.04. Health and Environmental Impacts of the unsafe disposal of menstrual products	6
Diagram .02. Advantages and Disadvantages of Different Sanitary Products.....	7
Fig.04. Process of using Menstrual Cups.....	8
Chart.03. Flowchart of usage of menstrual Cups.....	9
Fig.05. Menstrual Cups.....	10
Chart.04.. Double Diamond Design Process.....	13
Fig.07. Indian Women.....	16
Chart.05. Research Path.....	17
Chart.06. Stakeholders.....	18
Fig.08. Primary Stakeholders.....	19
Fig.09. Secondary Stakeholders.....	20
Fig.10. Tertiary Stakeholders.....	21
Chart no. 11 Awareness of Women toward menstrual cups in the survey.....	27
Chart no. 12 Menstrual cup users in the survey.....	27
Chart no. 13 Awareness of Women toward various sanitary products in the survey.....	27
Chart no. 14 Frequency of use of Menstrual cups in the survey.....	28
Chart.no. 15 Frequency of Sterilization of Menstrual cups in the survey.....	28
Chart.no. 16 Use of Sterilization of Menstrual cups in the survey.....	29
Chart.no. 17 Types of technologies used for sterilization Menstrual cups in the survey.....	29
Chart.no. 18 Methods of Sterilization of Menstrual cups in the survey.....	29
Diagram 03 Stage02: Generative Analysis.....	30
Diagram 04 Stage03: Generative Analysis.....	30

List of Figures

Fig. 12 Comfort.....	32
Fig. 13 Awareness.....	32
Fig. 14 Adaptation.....	32
Fig. 15 Environment.....	33
Fig. 16 Maintenance.....	33
Fig. 17 User Persona 1.....	34
Fig. 18 User Persona 2.....	35
Fig. 19 Mind Mapping.....	36
Fig. 20 Methods of Sterilization.....	38
Diagram 05 Methods of Sterilization and its pros and cons.....	39
Existing Products... ..	40,41
Fig 21 Understanding Product Gap.....	42
Fig 22 Product Analysis.....	43
Fig 23 Components of Sterilizer.....	44
Fig 24,25,26 User Scenario.....	45
Fig 27 Sirona Menstrual Cup sterilizing technique.....	46
Fig 28,29,30 Sirona Menstrual Cup Product Analysis.....	47
Fig 31 Product use Mapping.....	48
Fig 33 Kinaesthetic to understand the placement of the product in the environment.....	59
Chart no. 18 Concept Development.....	72
Fig 34,35,36 Concept 3 Renders.....	73
Fig 37,38 Working Rig.....	74
Fig 39,40,41 Mockups.....	75
Fig 42,43,44 Surface Development.....	76

List of Figures

Chart no. 19 Temp v/s Time Graph.....	79
chart no. 20 Process Chart.....	79
Chart no. 21 Venn Diagram... ..	86

Chapter 01 :

Introduction

Introduction: Menstrual cup



- A menstrual cup is a type of reusable feminine hygiene product. It's a small, flexible funnel-shaped cup made of rubber or silicone that you insert into your vagina to catch and collect period fluid.
- Cups can hold more blood than other methods, leading many women to use them as an eco-friendly alternative to tampons. And depending on your flow, you can wear a cup for up to 12 hours.
- A **menstrual cup** is a menstrual hygiene device that is inserted into the vagina during menstruation. Its purpose is to collect menstrual fluid (blood from the uterine lining mixed with other fluids).
- Menstrual cups are usually made of flexible medical grade silicone, latex, or a thermoplastic isomer. They are shaped like a bell with a stem or a ring. The stem is used for insertion and removal, and the bell-shaped cup seals against the vaginal wall just below the cervix and collects menstrual fluid. This is unlike tampons and menstrual pads, which absorb the fluid instead
- Affordable
- Environment friendly
- Safer than tampons. No risk of TSS & Bacterial Infection
- Holds more blood than pads or tampons
- Socially accepted
- Compatible with intimacy & wearable contraception like IUD

Fig.1. Source: <https://www.pexels.com/search/menstrual%20cup/>

Introduction: Menstrual cup & Sanitary Waste

1.2

As of 2021, There are 3,970,238,390 or 3,970 million or 3.97 billion males in the world, representing 50.42% of the world population. The population of females in the world is estimated at 3,904,727,342 or 3,905 million or **3.905 billion**, representing **49.58%** of the world population

India 2022, males make up 51.95% of the population at 730 million, while the number of females accounts for **48.05%** of the total population at **675 million**. That makes the gender split at 52% male – 48% female

There are over **355 million** menstruating women and girls in India, but millions of women across the country still face significant barriers to a comfortable and dignified experience with menstrual hygiene management (MHM)



AGE 12-49YRS

AVERAGE MENSTRUAL
CYCLE

4-5 DAYS

~ **8** SANITARY PADS/CYCLE

~ 8X12=

96 SANITARY PADS/YEAR

AVERAGE MENSTRUAL PERIOD~ 35 YEARS

96x35 =

3360 SANITARY PADS/WOMAN

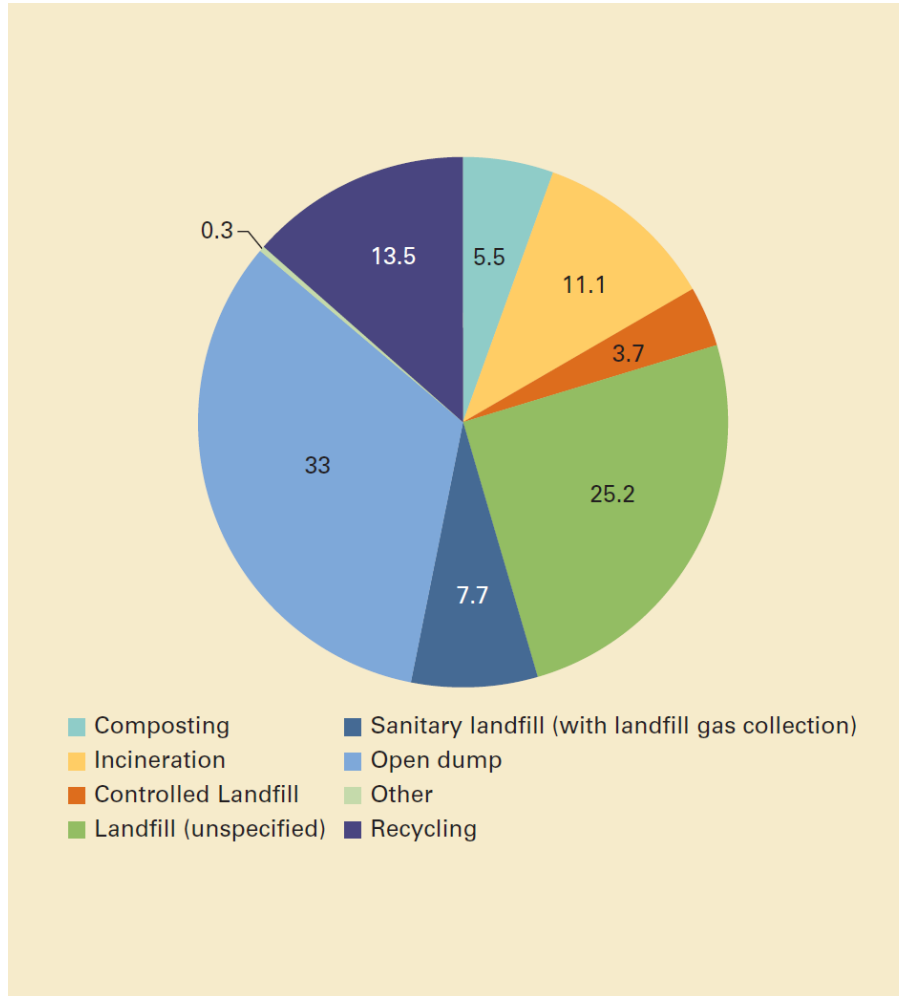
1.2.Introduction: Menstrual cup & Sanitary Waste

Around **12.3 billion** sanitary napkins, amounting to 113,000 tonnes of waste, reached India's landfills every year, according to a new study. Improper disposal and non-segregation of household waste leads to unhygienic working conditions for waste workers. Commonly available sanitary napkins constitute 90 percent plastic, the report claimed. India generates **3.3 million tonnes of plastic waste** every year, according to a Central Pollution Control Board report (2018-19). A single non-organic sanitary pad contains the plastic equivalent to about four plastic bags and takes up to **250-800 years** to decompose

Fig. 03. Source :
<https://www.downtoearth.org.in/news/waste/india-s-landfills-add-113k-tonnes-of-menstrual-waste-each-year-report-77247>



1.2.Introduction: Menstrual cup & Sanitary Waste



- It is a frequent misconception that technology is the solution to the problem of unmanaged and increasing waste.
- Technology is not a panacea and is usually only one factor to consider when managing solid waste. Countries that advance from open dumping and other rudimentary waste management methods are more likely to succeed when they select locally appropriate solutions.
- Globally, most waste is currently dumped or disposed of in some form of a landfill. Some **37 percent** of waste is disposed of in some form of a landfill, **8 percent** of which is disposed of in sanitary landfills with landfill gas collection systems.
- Open dumping accounts for about 31 percent of waste, 19 percent is recovered through recycling and composting, and 11 percent is incinerated for final disposal.

Diagram .01. Source :<https://www.downtoearth.org.in/news/waste/india-s-landfills-add-113k-tonnes-of-menstrual-waste-each-year-report-77247>

1.2.Introduction: Menstrual cup & Sanitary Waste

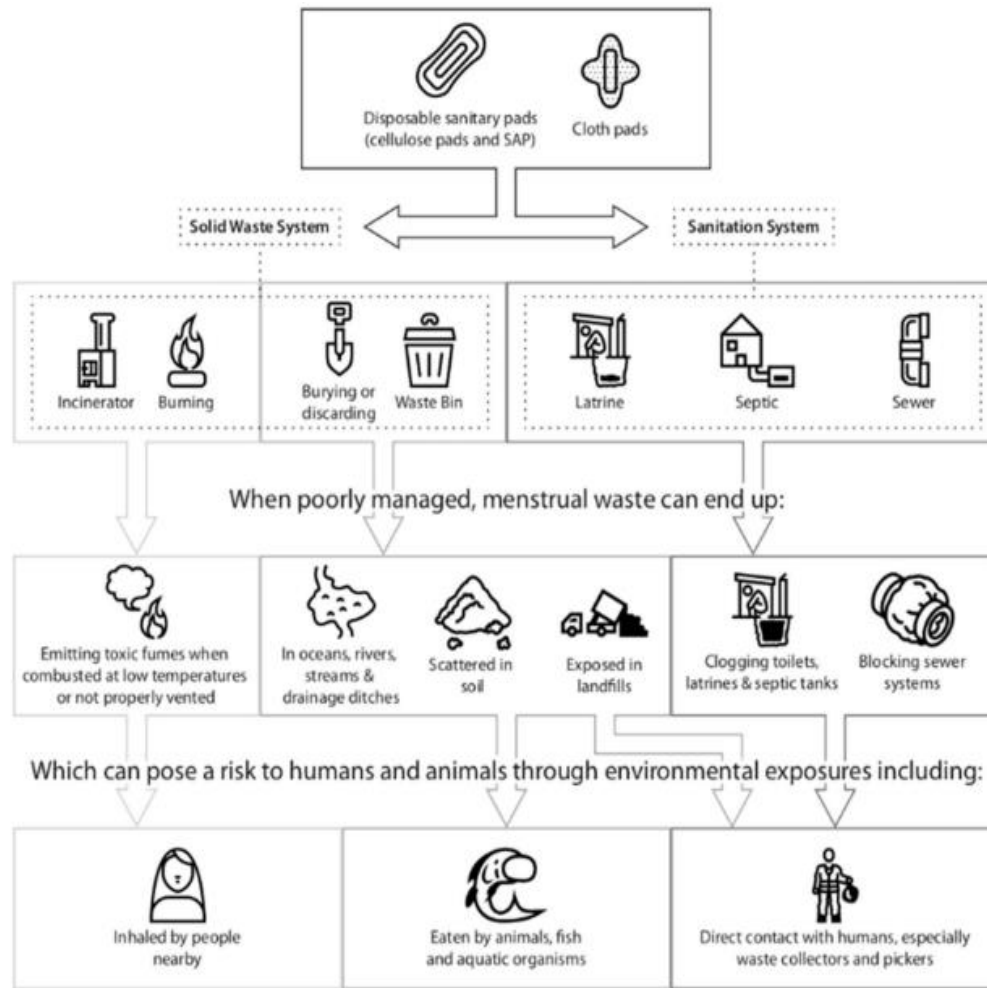


Fig.04. Source: <https://www.downtoearth.org.in/news/waste/india-s-landfills-add-113k-tonnes-of-menstrual-waste-each-year-report-77247>

- Reliable data analysis on the health and environmental impacts of the unsafe disposal of menstrual products such as tampons and pads is not available
- To date, scientific research assessing the health and environmental impacts of disposing of different menstrual health products has not been conducted. When d burned improperly toxic gases are emitted polluting the atmosphere, soil, and water bodies, and thus affecting the food chain
- When menstrual waste is not burned, it often accumulates in open dumpsites and pollutes the local surroundings.
- It is estimated that menstrual waste causes 6.3% of sewage-related debris along rivers and shorelines. Just as with other plastics this can lead to acidification and in the case of inland waters eutrophication. Eutrophication, the gradual enrichment of nutrients in a freshwater body, leads to increased algae production, ultimately resulting in extremely low oxygen levels in deeper waters.

1.2.Introduction: Menstrual cup & Sanitary Waste

MHM Product	Afford-ability	Amount of Waste generated	Cultural Appropri-ateness	Hygiene	Availability	Absorbency	Need for privacy, water and soap
Natural Materials (e.g. Mud, cow dung)							
Cloth (e.g. sari, kanga)							
Commercial disposable pads							
Tampons							
Commercial Reusable Pads							
Locally made, biodegradable, disposable pads							
Locally made reusable pads							
Period Panties							
Menstrual Cup							

Green: Advantage / This factor does not act as a barrier but supports the usage of product

Yellow: This factor could be a slight barrier for usage of this product

Red: Disadvantage / This is a clear barrier for the usage of this product

- Eutrophication is one of the leading causes of aquatic ecosystem degradation. Disposing of menstrual waste in the sewage system can lead to the clogging of toilets, latrines, septic tanks, or sewer systems, which ultimately leads to the direct contact of menstrual waste with humans, creating serious health risks.
- Menstruators habitually choose discrete disposal options over open disposal, e.g. discarding menstrual waste in latrines rather than open bins or incinerators, resulting in additional challenges.
- Furthermore, used menstrual products are frequently being wrapped in plastic or paper before disposal, due to shame or promotion on the packaging.
- Especially in areas, where waste collection systems are deficient or non-existent, menstrual waste is mostly disposed of in the open or in latrines, creating exposure risks and environmental pollution, particularly in dense urban areas.

Diagram .02. Source : <https://www.downtoearth.org.in/news/waste/india-s-landfills-add-113k-tonnes-of-menstrual-waste-each-year-report-77247>

Introduction: How to use Menstrual cup

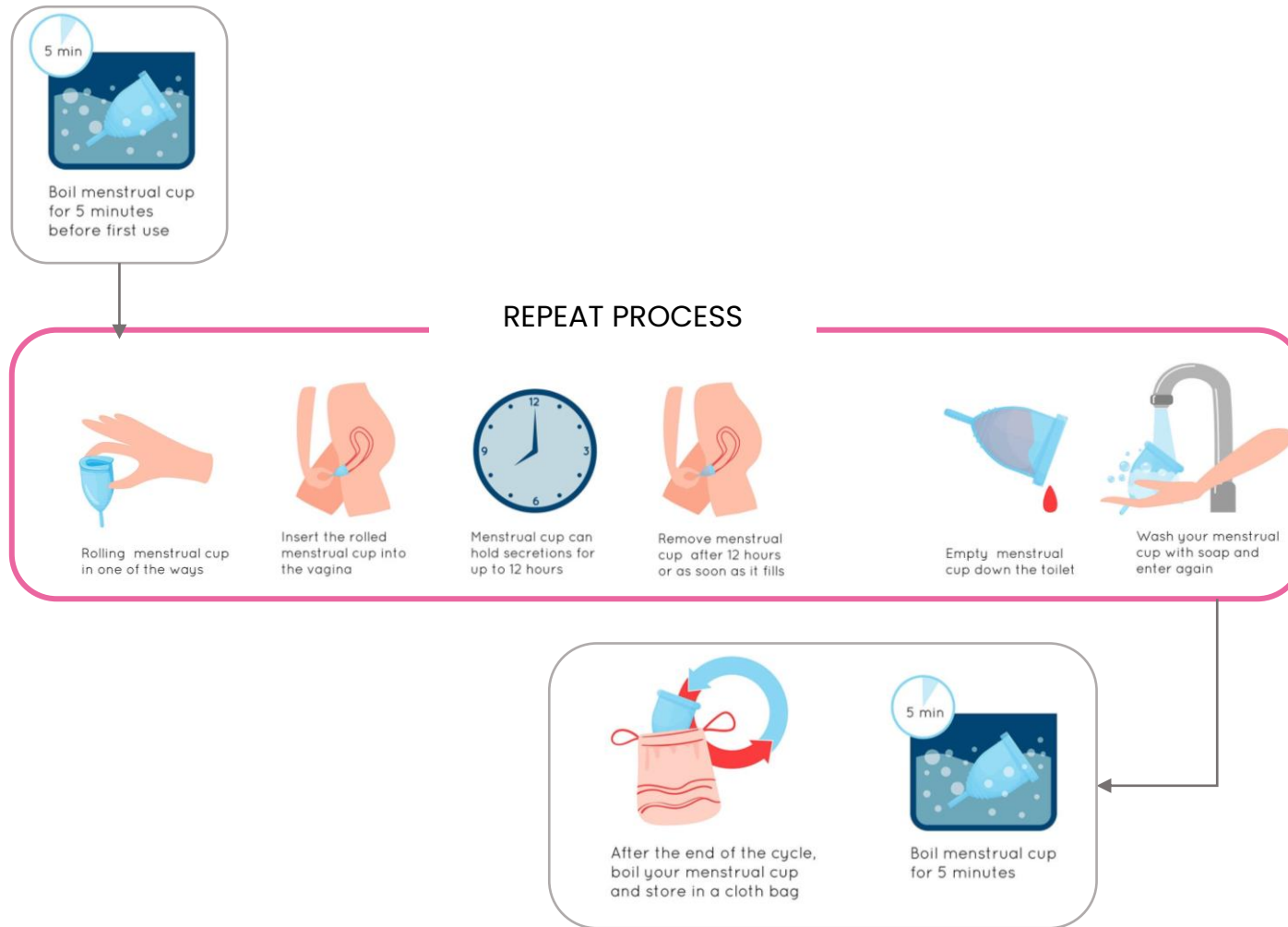


Fig.04. Source <https://www.freepik.com/>:

1.3.Introduction: How to use a Menstrual cup

At the beginning of the menstruation

- Step 01:** Sterilize the cup (hot boiling water/steam/UV) before use. This will eliminate any bacteria build-up on the cup (if any)
- Step 02:** Wash the cup using hand soap/ cup cleanser. Water also facilitates as a lubricant to insert the cup.
- Step 03:** Insert the cup as per instructions fig.
- Step 04:** Empty the cup every 4-8 hrs depending on the flow of the cycle.
- Step 05:** Wash the cup every time it's emptied. It will avoid the blood build-up in the cup.

By the end of the menstruation

- Step 06:** Wash the cup using hand soap/ cup cleanser.
- Step 07:** Sterilize the cup (hot boiling water/steam/UV) before use. This will eliminate any bacteria build-up on the cup (if any) during use.
- Step 08:** Store the cup in a dry container/bag. Make sure there is no dust or moisture trapped.

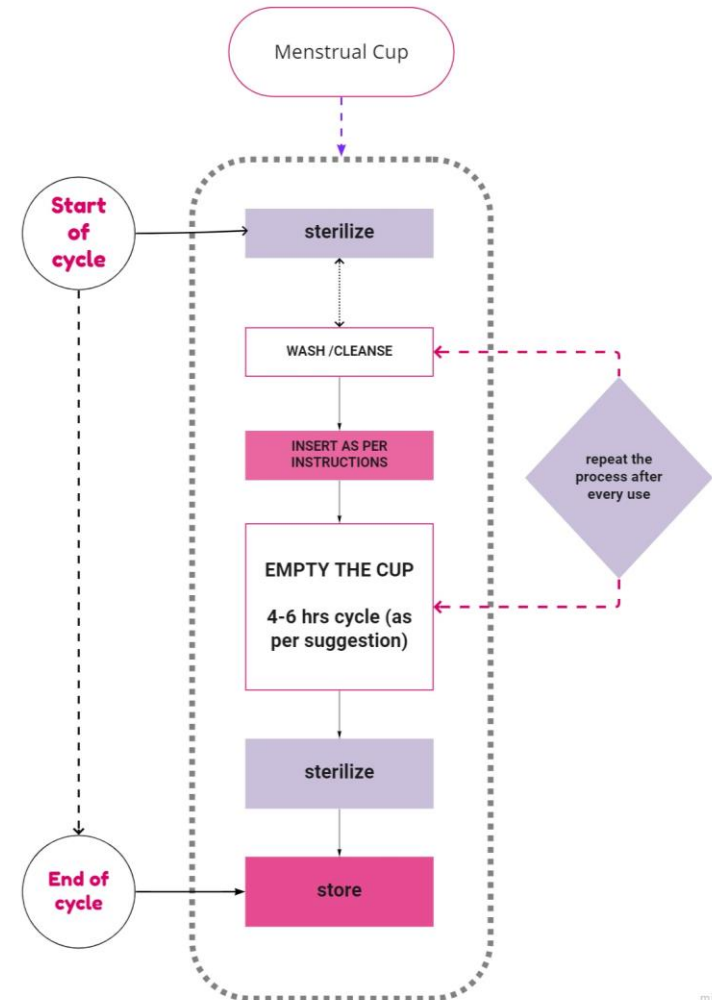


Chart.03.. Source: Author

Introduction: Material & Maintenance

1.4

Material

Menstrual cups are usually made of flexible medical-grade silicone, latex, or a thermoplastic isomer.

Medical grade silicones are silicones tested for biocompatibility and are appropriate to be used for medical applications.

Medical grade silicones are generally grouped into three categories: non-implantable, short-term implantable, and long-term implantable. Materials approved as Class V and VI can be considered medical grade.

Most medical-grade silicones are at least Class VI certified. Silicone suppliers and some silicone prototyping companies provide guidelines for material use.



Fig.05. Source: <https://www.google.com>

1.4. Introduction: Material & Maintenance

Silicone Sterilization

Silicone is used in a variety of medical instruments and equipment which must be sterilized before use. Three main methods of sterilization can be considered: steam sterilization (autoclave), irradiation and ethylene oxide.

Steam Sterilization by Autoclave

Steam sterilization is typically carried out in an autoclave at **121°C (250°F) for 15 minutes**, although other conditions are often used (Rogers, W., 2005). Silicone tubing may start to become gummy after having being steam sterilized several times and should then be replaced.

Irradiation:

Gamma Irradiation

Gamma irradiation is widely used for sterilization of silicone tubing. However, some changes are produced in the silicone, principally an increase in cross-linking, causing an increased hardness and shape memory .

Electron Beam Irradiation

Electron Beam Irradiation is an alternative to gamma rays. The physical effects are similar, but somewhat less, to those found with gamma irradiation

Ethylene Oxide

Ethylene oxide (EO) is a very effective sterilizing method for most silicone materials (Rogers, W., 2005). The ethylene oxide is adsorbed by the silicone and must be removed by post-cycle aeration before the equipment is used. Appropriate testing is required to ensure that removal has occurred. A study (McGunnigle, R.G., 1975) showed that silicone tubing adsorbed about 85% less ethylene oxide than PVC tubing or polyester / polyurethane tubing. Also, desorption of the ethylene oxide was much faster for the silicone tubing than for the other two polymers. Ethylene oxide sterilization was found to have no significant adverse effects on platinum or peroxide cured silicone (Gautriaud, E.), so it is recommended in most cases for these materials. Since ethylene oxide is a toxic, carcinogenic gas, appropriate safety measures should always be in place.

Chapter 02 :
Design
Research
Methodology

Design Research Methodology

02

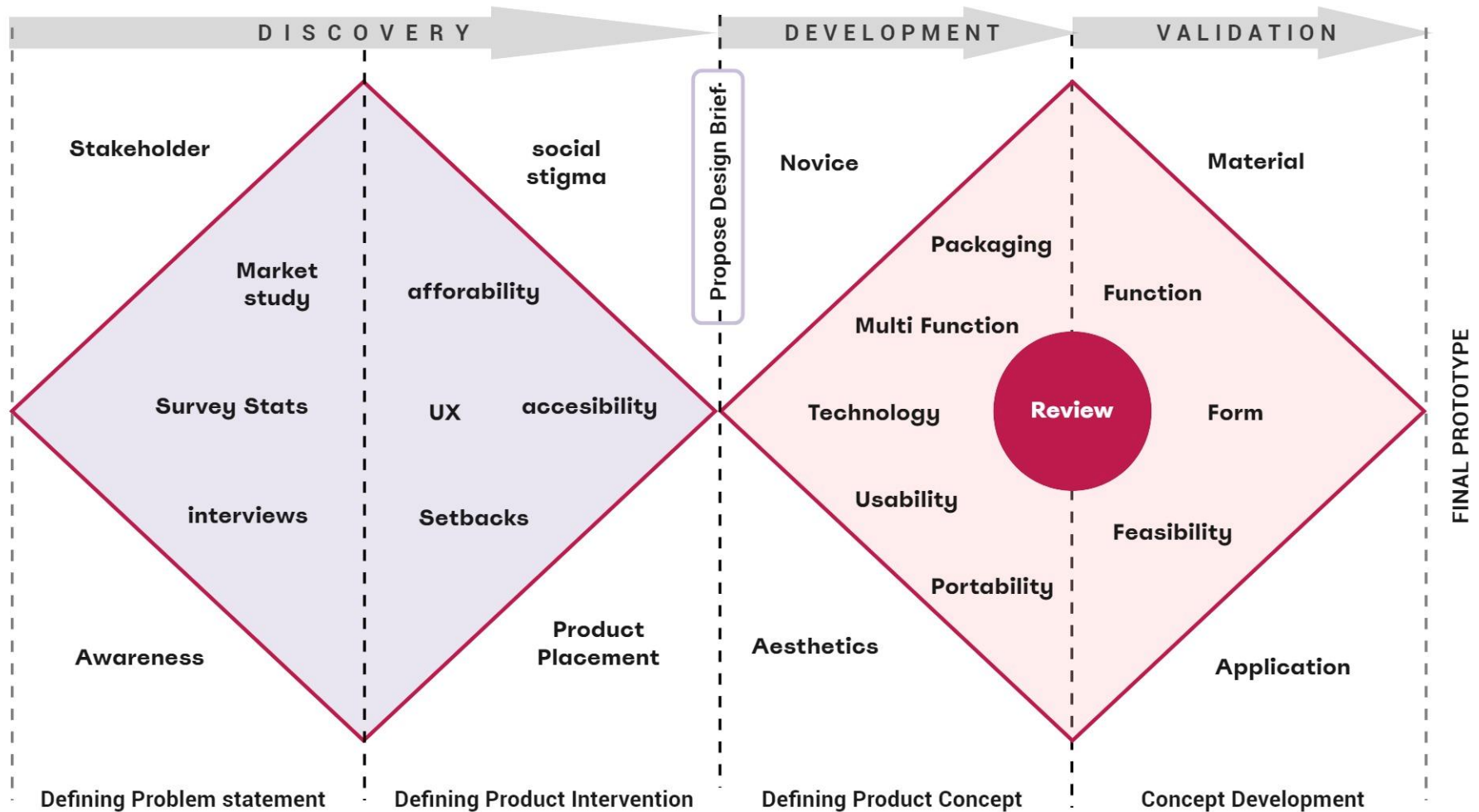


Chart.04.. Source: Author

Double Diamond method

Discovery : The stage began with the research on menstrual cups & issues associated with them. The pros & cons defined the open-ended research about the product. The market study and user interviews inferred the issues with the product & process. Thus the issue of sterilization was considered to be taken forward. There are other factors such as stakeholder and product awareness was taken into consideration to justify the significance of the issue.

This led to the problem statement evolving around the maintenance & sterilization of menstrual cup

Depending on the survey stats received from the interview, empathy mapping of the features of the existing product & processes is reviewed. The aspects such as affordability, access and user experience & interaction with the product were the touch points found. Parallely the product gap in the market enables the key features for product placement in the market.

Proposed design brief of the menstrual cup sterilizer

Chapter 03 :

User Study

User Study: Demographics

3.1

In India in 2022, males make up 51.95% of the population at 730 million, while the number of females account for 48.05% of the total population at 675 million. That makes the gender split 52% male – 48% female

There are over 355 million menstruating women and girls in India, but millions of women across the country still face significant barriers to a comfortable and dignified experience with menstrual hygiene management (MHM)

India 2022, **675 million** Women



355 million

Menstruating women



Age **12-49** yrs.

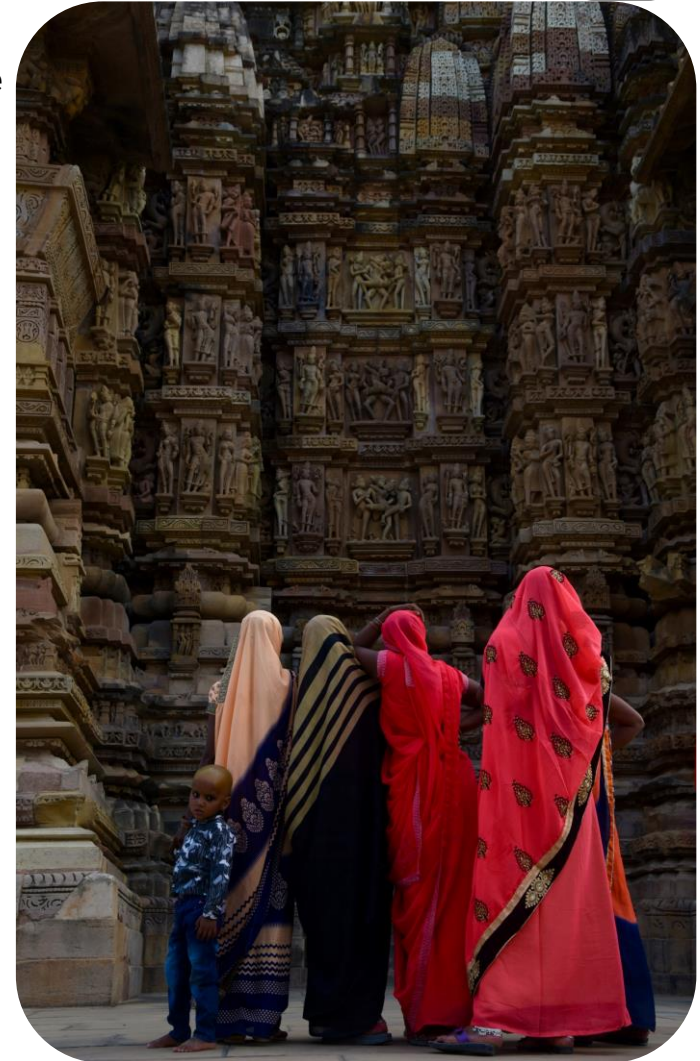


Fig.07. Source: <https://unsplash.com/photos/uO1MUMn0Xzc>

User Study: context Study (research path)

3.2

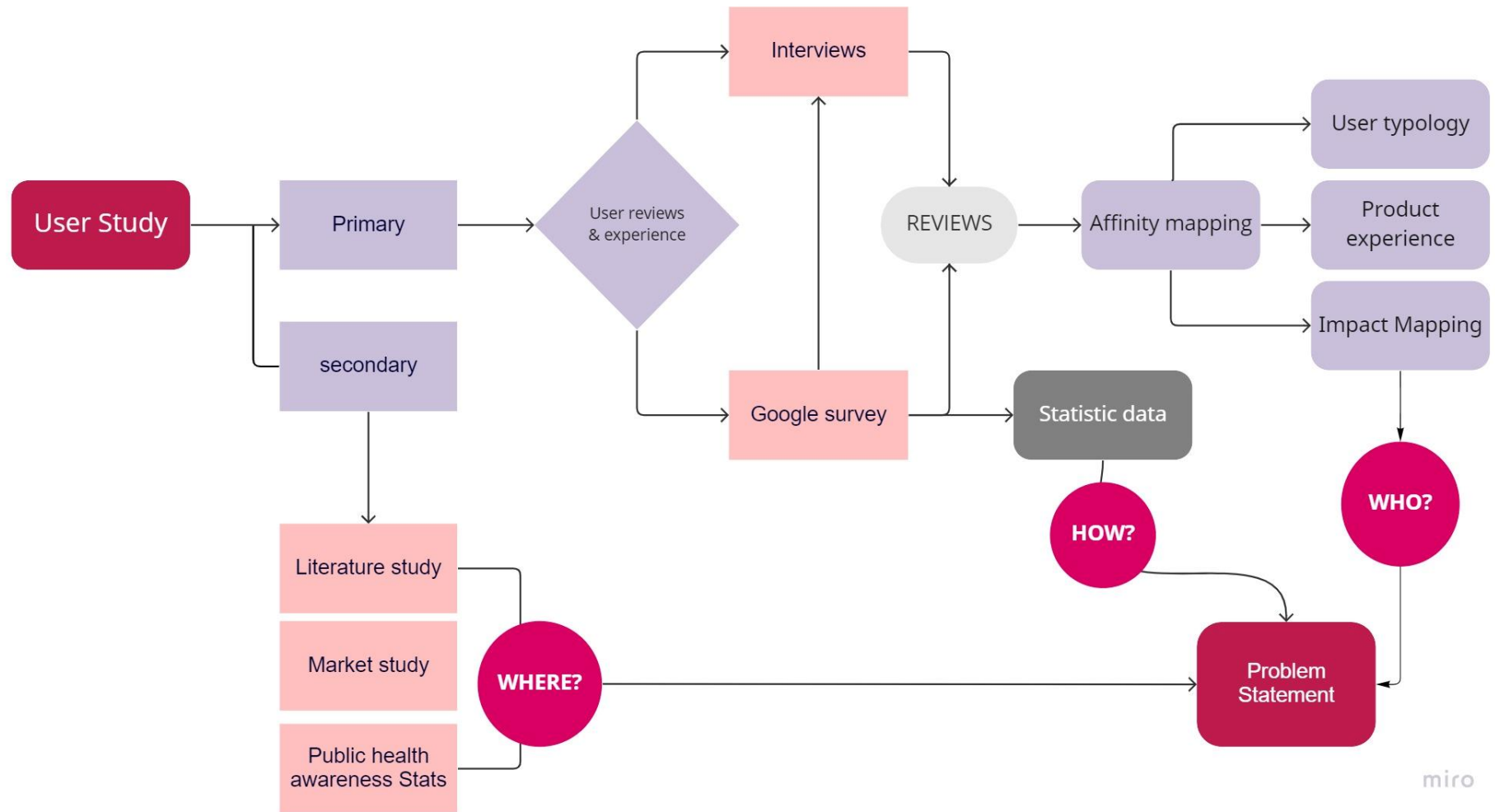


Chart.05.. Source: Author

User Study: context Study

3.2

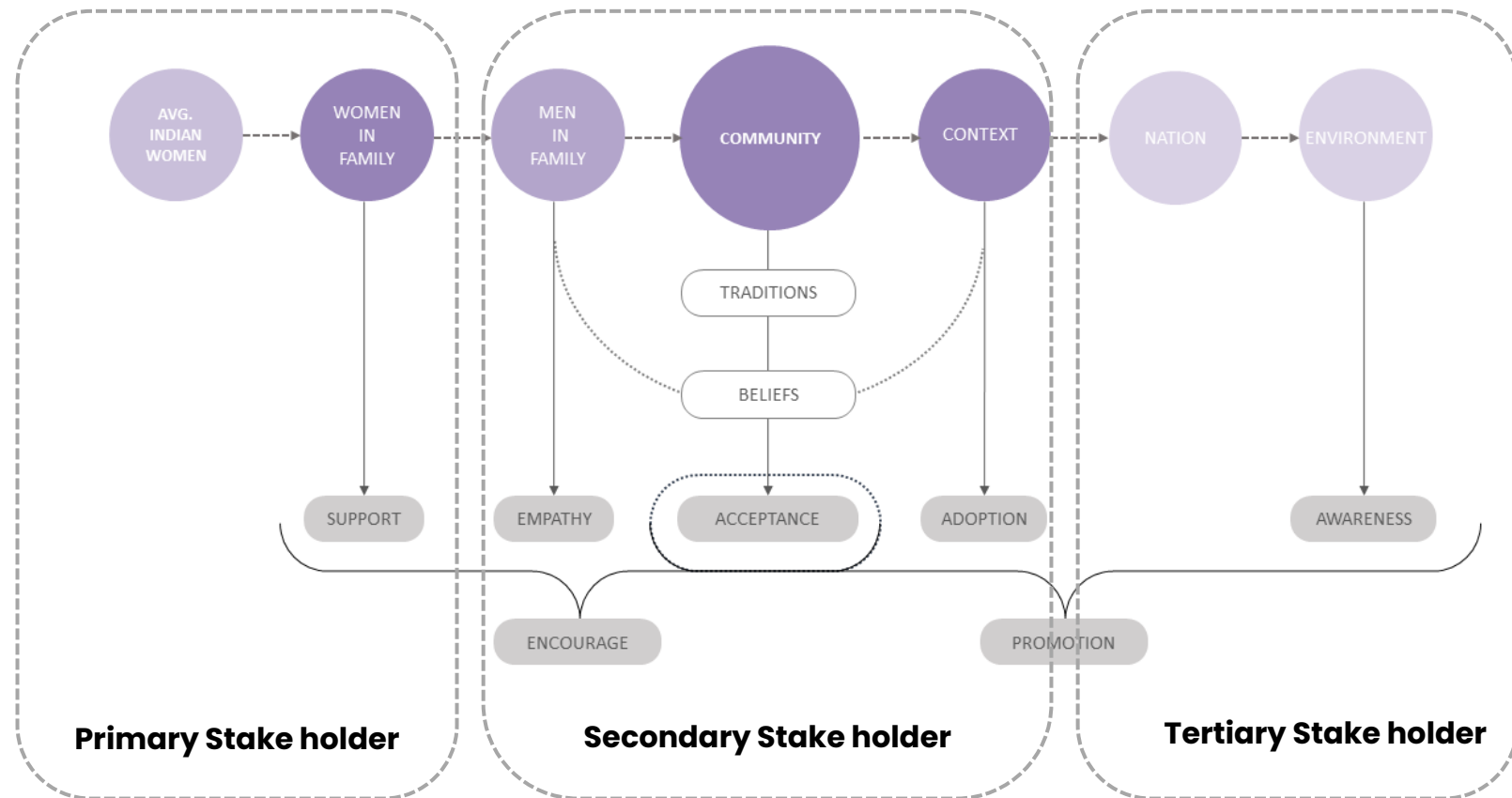


Chart.06.. Source: Author

Primary Stakeholder

- For average Indian women in current times. The women's peers in the family or close circle play an important role in any personal decision-making.
- They seek to support and validation from them. This group may include mothers, sisters, cousins, friends, or any immediate women in the family.
- The insights, conceptions, and experiences influence the decision. For instance, the daughter in the family solely depends on her mother for self-knowledge & menstrual hygiene.
- A mother would suggest and educate her daughter about things that she thinks are safe and won't tamper with health, derived from her own experiences
- In the case of menstrual cups, mothers are often unaware and inexperienced about their use hence they don't promote the use to their daughters.



Fig.08. Source: <https://unsplash.com/photos/uO1MUMn0Xzc>

Secondary Stake holder

- Being patriarch-conditioned, women in Indian households are always forced or asked to seek approval from the men in the house before doing anything.
- This has been one of the major issues why women have ignored or suppressed the pain, just because they can't tell men what are they going through.
- This had severe reparation on women's health especially menstrual health. That they have ignored the symptoms until they have caused irreversible harm to their body.
- Change has been happening and the current society seems to be progressing. Today women don't seek permission to healthcare at least in urban areas.
- They expect men to empathize with their issue as they can't relate. Which would give women the confidence to express their pain & inconveniences.

Fig.09. Source: <https://unsplash.com/photos/uO1MUMn0Xzc>



Tertiary Stakeholder

- Being vocal about menstruation & menstrual pain itself is considered a Taboo in India. Religious aspects and community conditioning have always ignored the problem faced by women.
- Majority have norms that have always put women on a pedestal & expected to perform the best of their duties.
- Women have been made to feel that they are responsible for any setback of the family which she is just to serve.
- Any personal decision made by a woman also has a stake in the community she is living in. The response can be good or bad. She can be supported or can be suppressed badly for speaking up.
- This also affects her menstrual health decision. Per se the community is orthodox and women are suffering from severe pain like TSS the symptoms of ill health will be considered a fad and will be treated by some ritualized or home remedies which can make it more severe.

Fig.10. Source: <https://unsplash.com/photos/uO1MUMn0Xzc>



User Study: Health & Hygiene

3.3

Doctors insights Dr. Shweta Pagore- Shinde (Physician)

- Menstrual hygiene is a **myth** for women in India including in urban & rural regions.
- Women tend to ignore the basic inconvenience until it becomes a severe infection.
- About **80 %** of women don't complete the treatment after preliminary medication.
- Most of teens & young girls suffer from bacterial & Yeast infections due to a **lack of awareness**.
- Recently, **TSS** is seen in many girls studying/ working, due to improper intimate hygiene, long use of sanitary napkins & types of clothing.
- Women above age in their 30s mostly ignore the infections resulting in severe **vaginitis**, which further can lead to cancer if not treated properly.
- While the other group of women of middle age prefers to undergo **hysterectomy** due to constant infections.



Fig.011. <https://www.google.com/search?q=women+menstrual+health>

User Study: Survey

3.4

Methodology

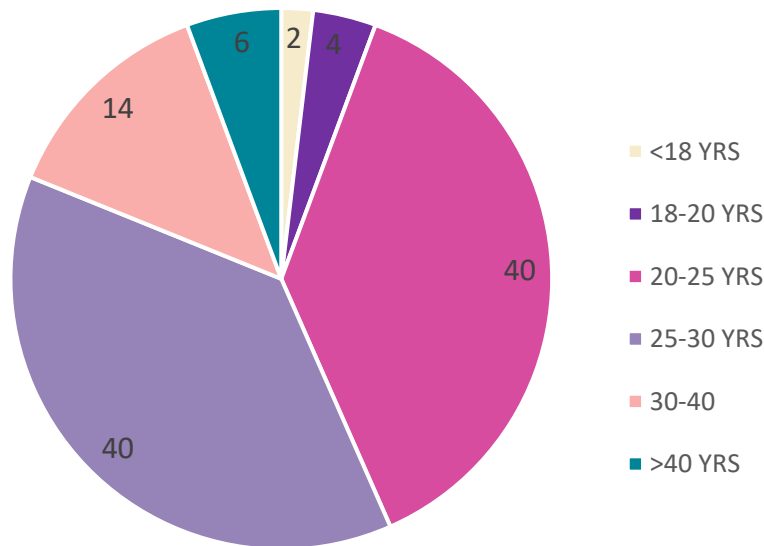
The survey has been conducted to understand the preferred menstrual product by women.

STAGE 01: The questionnaire was focused on the age group, products they are currently using, methods of collection, the reason behind the use of the product, and specific brands & materials.

STAGE 02: It was focused to check awareness about the menstrual cup, reasons for not choosing the cup, and physical & psychological barriers.

STAGE 03: It was focused on active users of menstrual cups. It inquires about the issues faced by the users, method of cleansing & sterilizing, information about accessories & insights.

STAGE 04: Personal interviews were conducted with the insightful participants to have a better understanding of the issues



Women participated in the survey

Chart.07.. Source: Author

User Study: Survey

Survey on Menstrual hygiene Products

This research focus on the women's choice of menstrual products and reasoning of the choice. It intent to address the discomfort and awareness of sustainable approach to menstrual hygiene products.

* Required

What is your Work status? *

☐ Student

☐ Working

☐ Other: _____

Are you aware of Menstrual Cups? *

☐ Yes

☐ No

☐ Not sure

What is your age? *

☐ under 18 years

☐ 18-20 years

☐ 20-25 years

☐ 25-30 years

☐ 30-40 years

☐ Above 40 years

Stage 01:

The questionnaire was focused on the age group, products they are currently using, methods of collection, the reason behind the use of the product, and specific brands & materials.

Google form : <https://forms.gle/5B4TAFxerhirMdC7>

Questionnaire

1. Age
2. Work status
3. Methods of collection
4. Preferred brands
5. Price range of products use
6. Are they aware of the menstrual cup?
7. How do they know about cup?
8. Are cup users or no?
9. What are reasons for not using cup

Stage 01: Statistics & Analysis

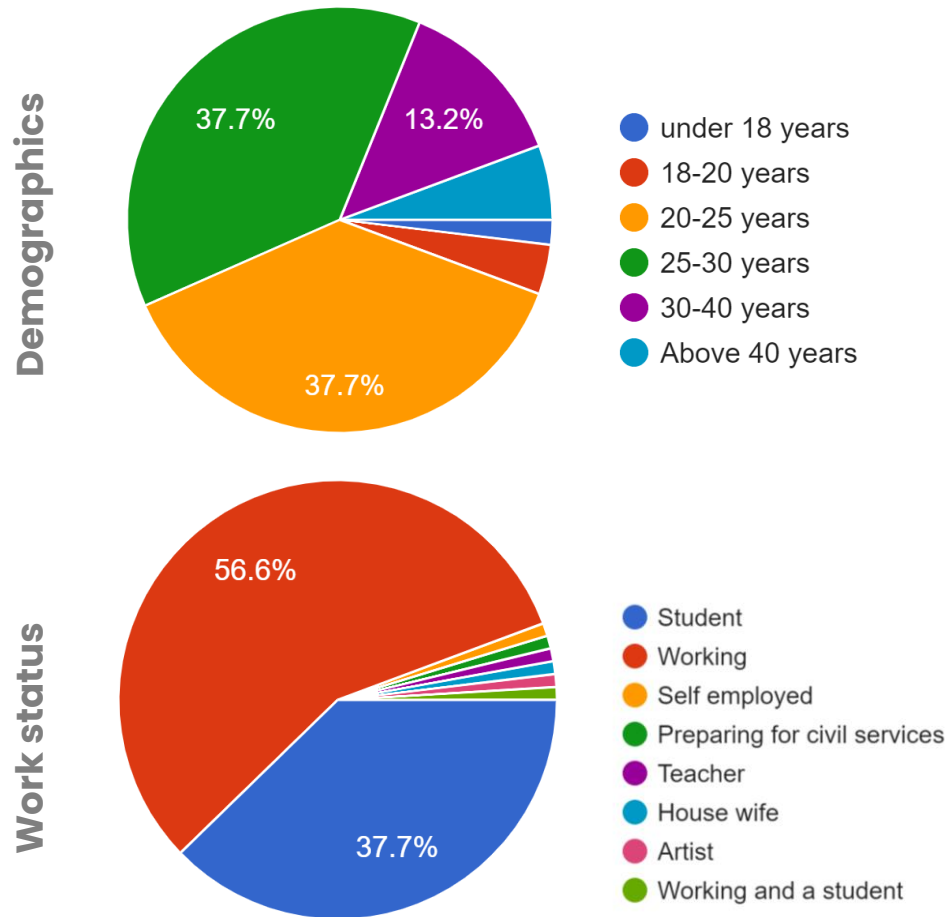


Chart.08 & 09.. Source: Author/Google forms

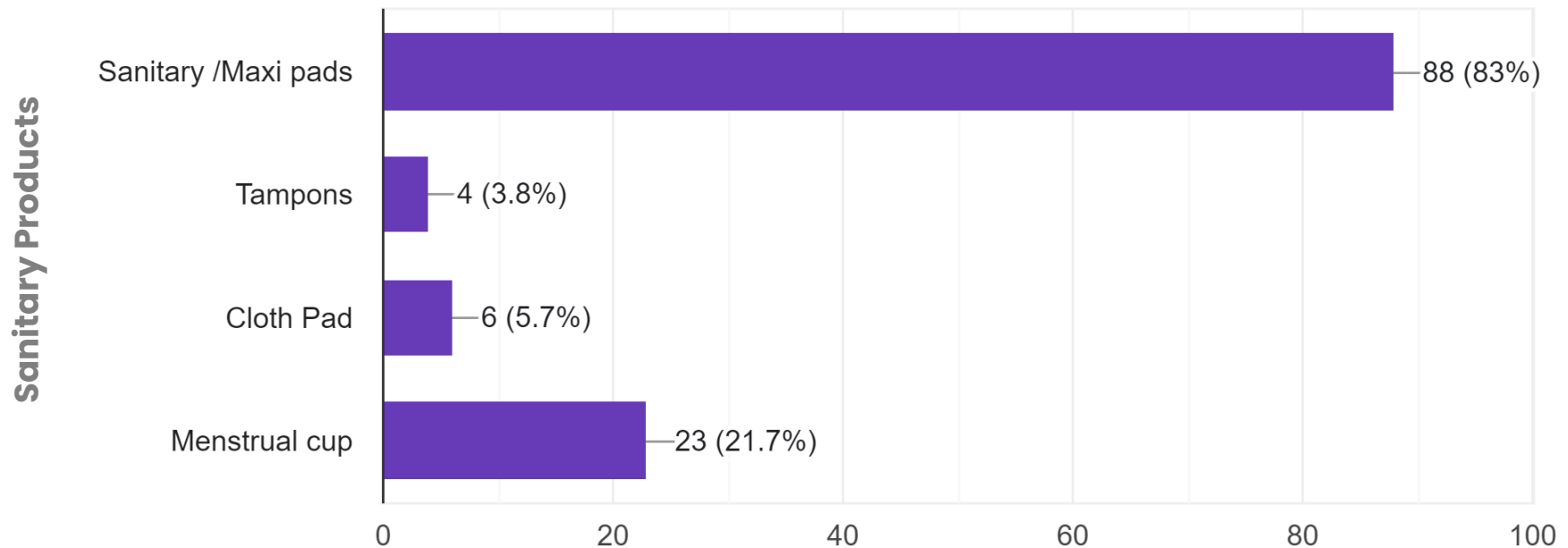
Target User

The demographics of the participants majorly range in the age group of 20-30 years old. The second group range from 30-40 years old. The group consists of the working & student population.

Observations

The demographics of the participants are the most mobile group. They spend a significant amount of day traveling. It also helps understand the user choices of utilities & accessories.

Stage 01: Statistics & Analysis



Observations

The majority of the demographics prefer sanitary pads as compared to a menstrual cup or any other sanitary product. Sanitary pads being a popular product for over 100 years is not very easy to replace. Yet the new generation is switching to cup due to its cost efficiency, adaptability, and sustainable approach. About 21% of the 120 women who switched to cups in the past 1.5 years is a significant change.

Chart.10. Source: Author/Google forms

Stage 01: Statistics & Analysis

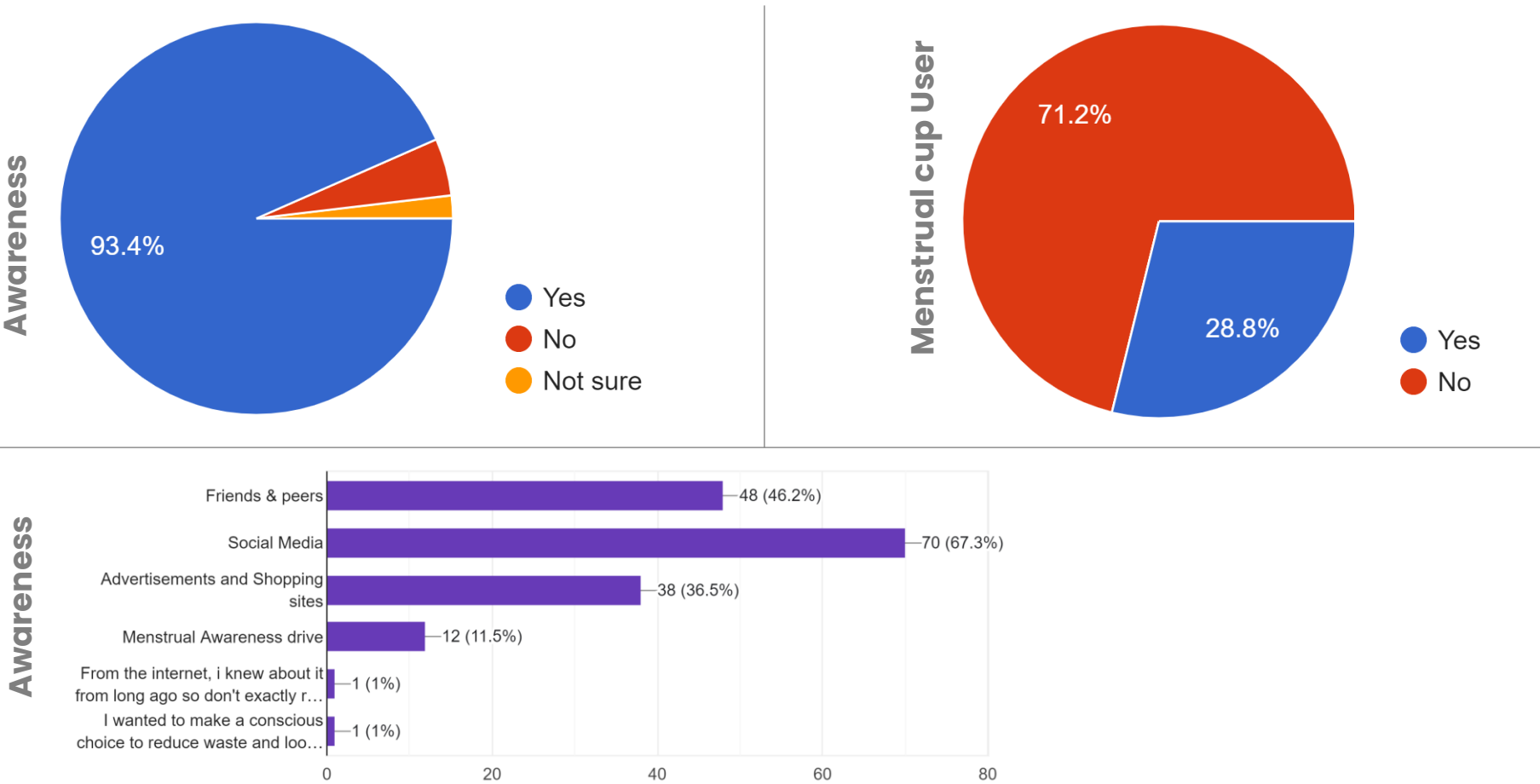


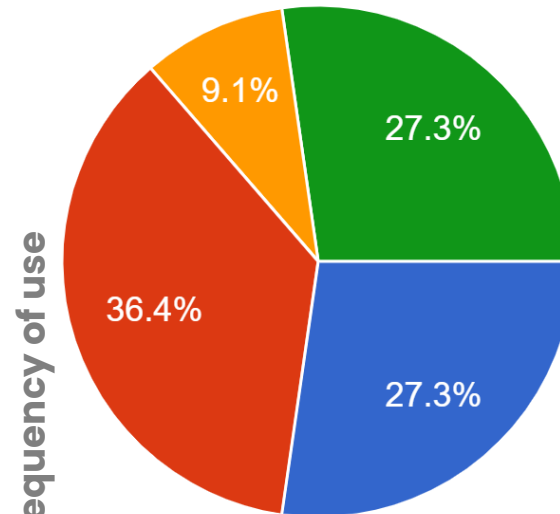
Chart no..11/12/13.. Source: Author/Google forms

Stage 02: Analysis

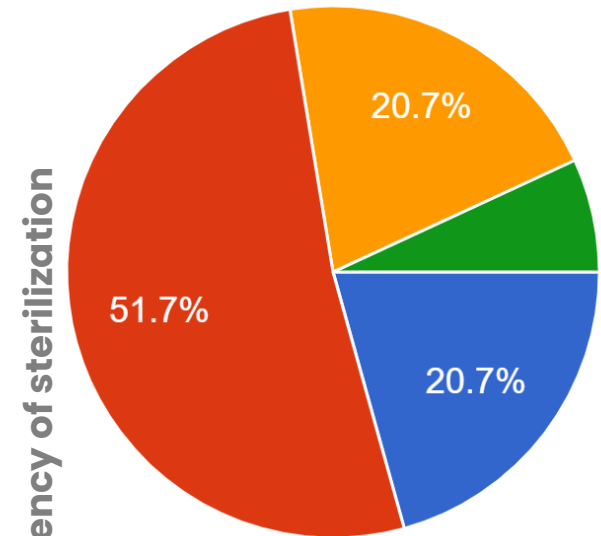
STAGE 02: It was focused to check awareness about the menstrual cup, reasons for not choosing the cup, and physical & psychological barriers.

Questionnaire

1. Frequency of use of menstrual cup
2. Frequency of sterilizing menstrual cup
3. Issues faced during the use of menstrual cup
4. Overall review of menstrual cup



- I tried it just once and disliked it.
- I use it regularly for my cycle throughout.
- I use on couple of days of my cycle
- I use it with other sanitary products



- Everyday
- start and end of the cycle
- at the end of the cycle
- I don't sterilize the cup that often.

Stage 02: Analysis

Questionnaire

1. Do they have a sterilizer
2. Technology used for sterilization
3. Methods of sterilization.
4. Issues faced during sterilization

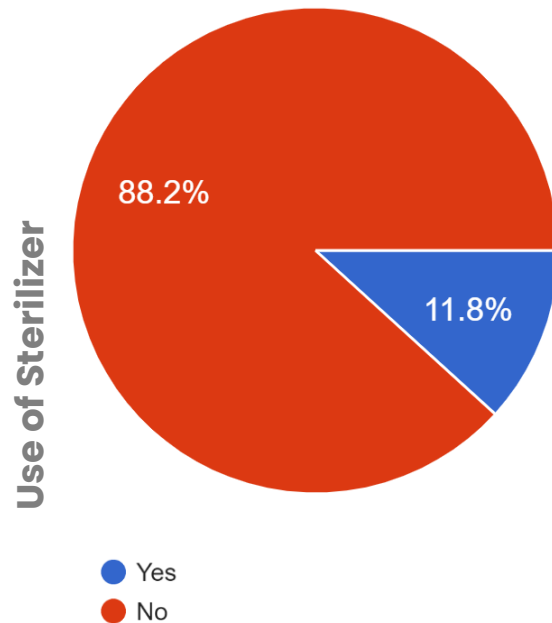
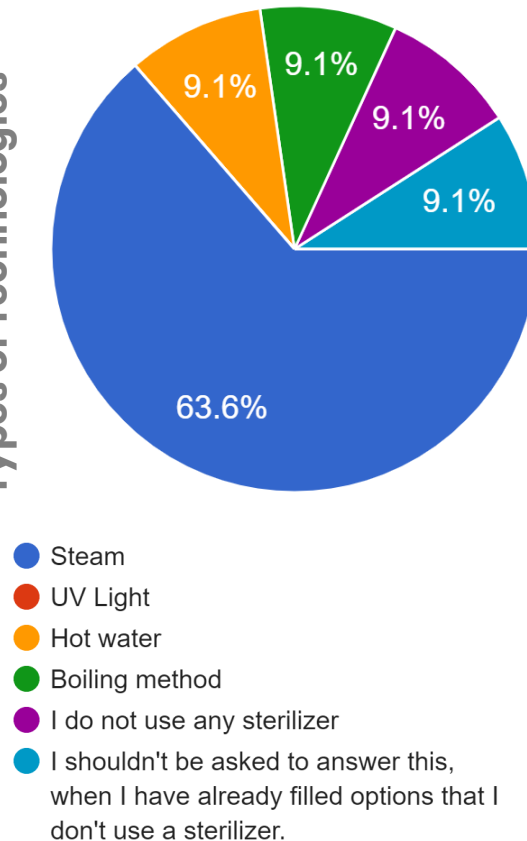
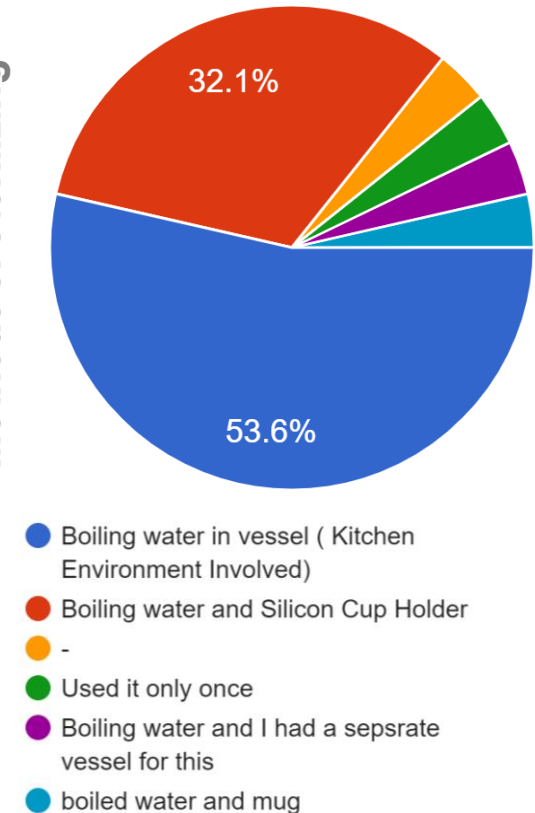


Chart.16/17.. Source: Author/Google forms

Types of Technologies

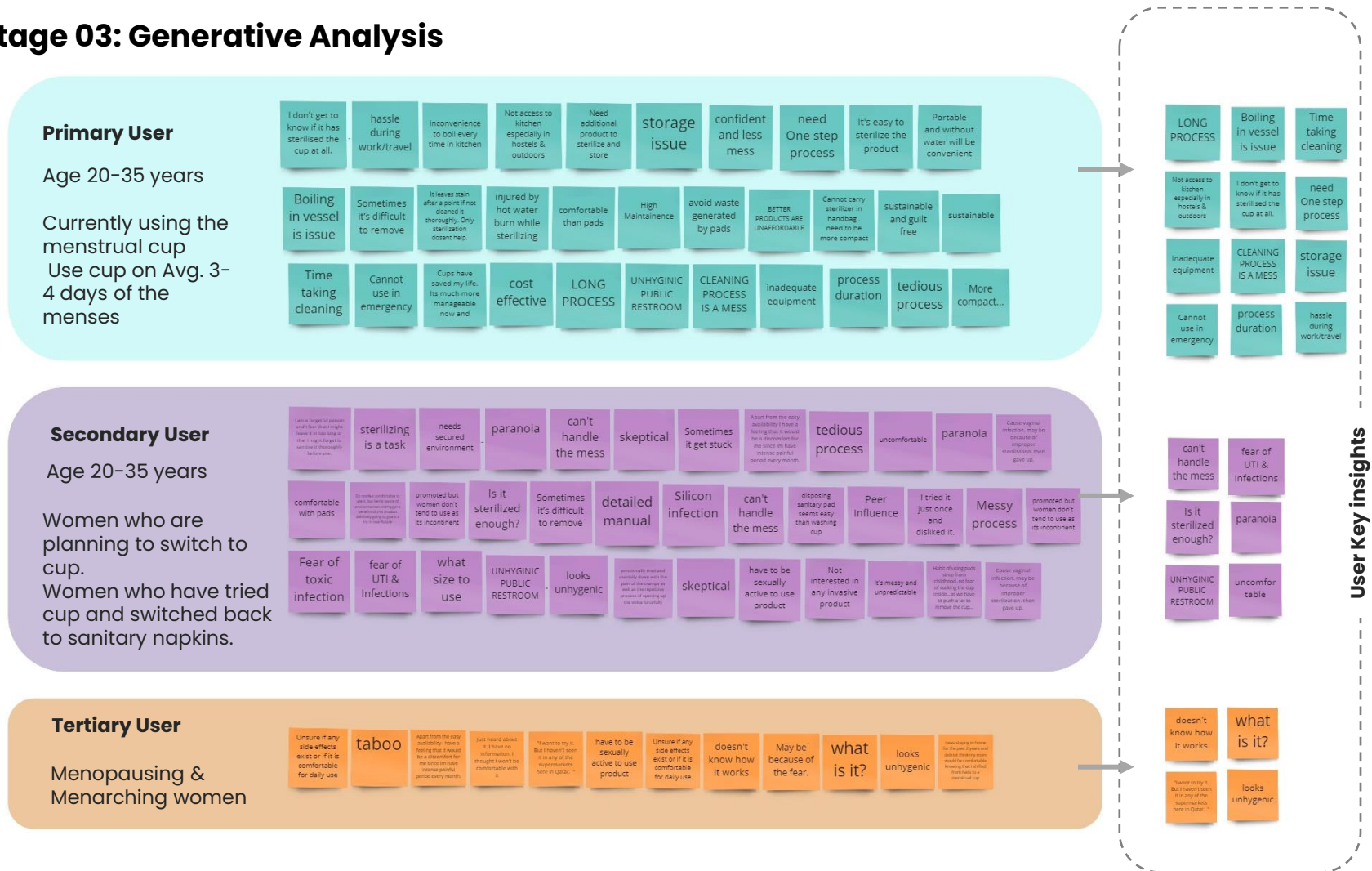


Methods of Sterilizing

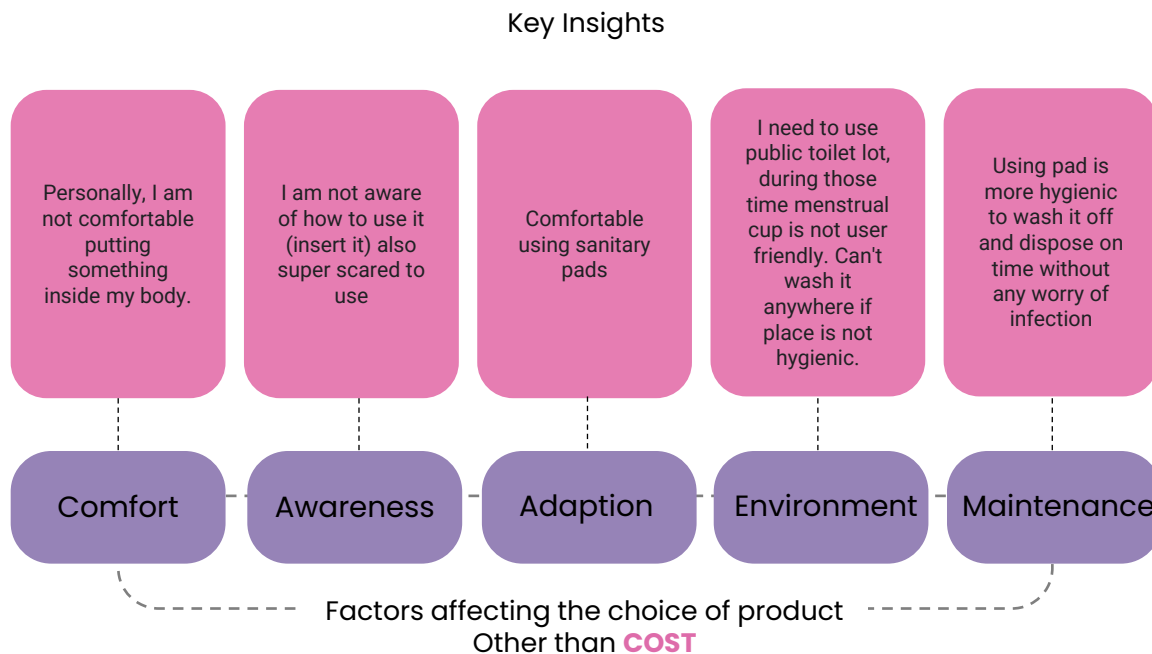


User Study: Survey

Stage 03: Generative Analysis



Stage 03: Generative Analysis



Women have habit of using sanitary pads for years now. Switching to different products needs physical as well as psychological readiness.

Apart from adaption, awareness and environment also play an important role in the choice of the product.

Stage 03: Generative Analysis

Comfort

The choice depends on the tangible and intangible aspects of comfort. The materials, methods and more than physical aspects psychological aspects too play an important part. Adaptation of new product can cause major shift in the habit which can sometimes be discomforting is one of the major demotivating factor.



Fig no. 12

Awareness

Most women are not aware of the menstrual cup & its benefits. The conditioning to use sanitary napkins has developed the habit of disposing of the used products. The shift of sterilizing & reusing the menstrual cup is widely related cloth is considered unhygienic



Fig no. 13

Adaption

Adapting to the cup demands a change in lifestyle. Which most women are not ready for. Women above the age of 40 are on the verge of menopause and don't prefer changing products for a matter of a few years. Also the mother of teen girls hasn't experienced the use of cups. Hence they don't even promote the use of cups to their younger generation.



Fig no. 14

Fig. no 12 Source: <https://www.dreamstime.com/menstruation-cycle-feminine-hygiene-protection>

Fig. no 13 Source: <https://www.change.org/t/period-products-en-us>

Fig. no 14 Source: <https://unsplash.com/photos/mZel4xJrMUM>

Stage 03: Generative Analysis

Environment

The environment also plays an important role. In the Indian context, menstrual practices are considered to be taboo and cannot be talked about in public or in the presence of men. Households are the best comfort zone for women to change their pads. But in the case of public restrooms, they highly demotivate women to even use them for urination. This has led to women developing a fear of infections & UTIs. Changing Cups involves washing them in running water & considering the environment women prefer disposable alternates rather than sustainability.

Maintenance

Women have adopted the practice of disposing of used sanitary products. It is quick and safe considering the fear of bacterial growth or infections. Cleaning and sterilizing the menstrual cup after every use is a tedious task for women. Apart from that, the kitchen is considered as a sacred space in Indian households, Taking any menstrual practice or product to the kitchen is considered to be an immoral practice. This demotivates women to adopt menstrual cups.



Fig. no 15 Source: https://commons.wikimedia.org/wiki/File:Boiling_a_menstrual_cup2.jpg

Fig. no 16 Source: <https://www.google.com/search?q=public+toilets+women&>

User Study: User Interviews

3.5

Stage 04: Generative Analysis

User Interview 01: Megha Patil

30 yo, Architect

Being an architect I have to constantly keep moving to places. On sites, especially on ongoing construction sites, there is a huge inconvenience of washrooms. I have to use the common worker's washroom in case of emergency. And I don't think I will be comfortable enough to do my business with men around

I prefer using a menstrual cup only when I am working in the office. It is comfortable & hygienic for indoors scenarios. With traveling & no washrooms around the cup is very uncomfortable to carry & clean.



Fig. no 17 Source: Author

Stage 04: Generative Analysis

User Interview 02: Asmi Rao

26 yo, Student

I am a writer & traveller. Most of the time I travel in and around hilly regions. Menstruating during traveling is exhausting. There are times when I don't get to use the washroom throughout the day. And the one you get may not be clean

I tried using a menstrual cup once but it is difficult to clean & sterilize. I switch back to sanitary napkins as they are easy to dispose of & less messy as compared to cups.

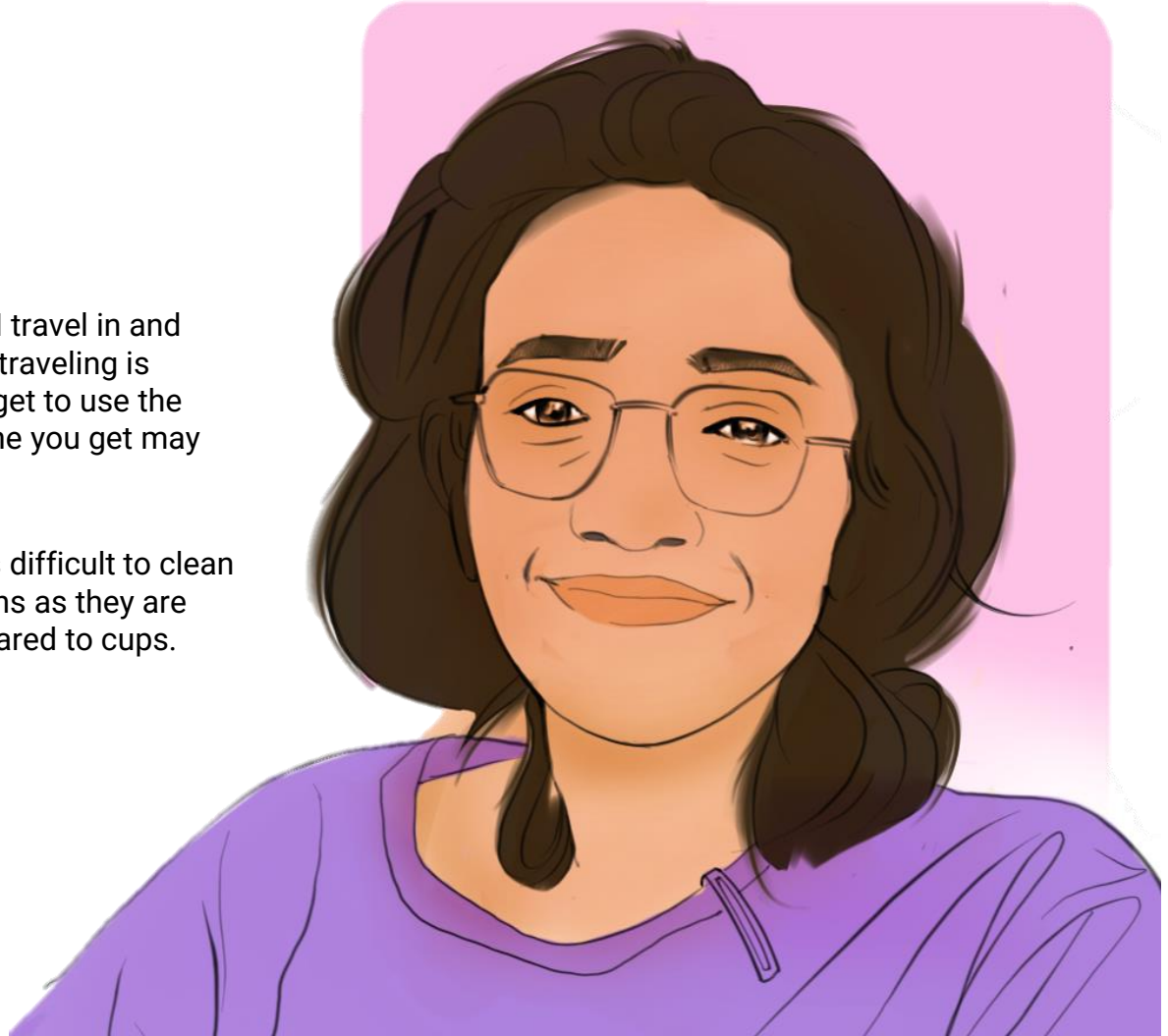


Fig. no 18 Source : Author

User Study: Mind mapping (Empathy)

3.6

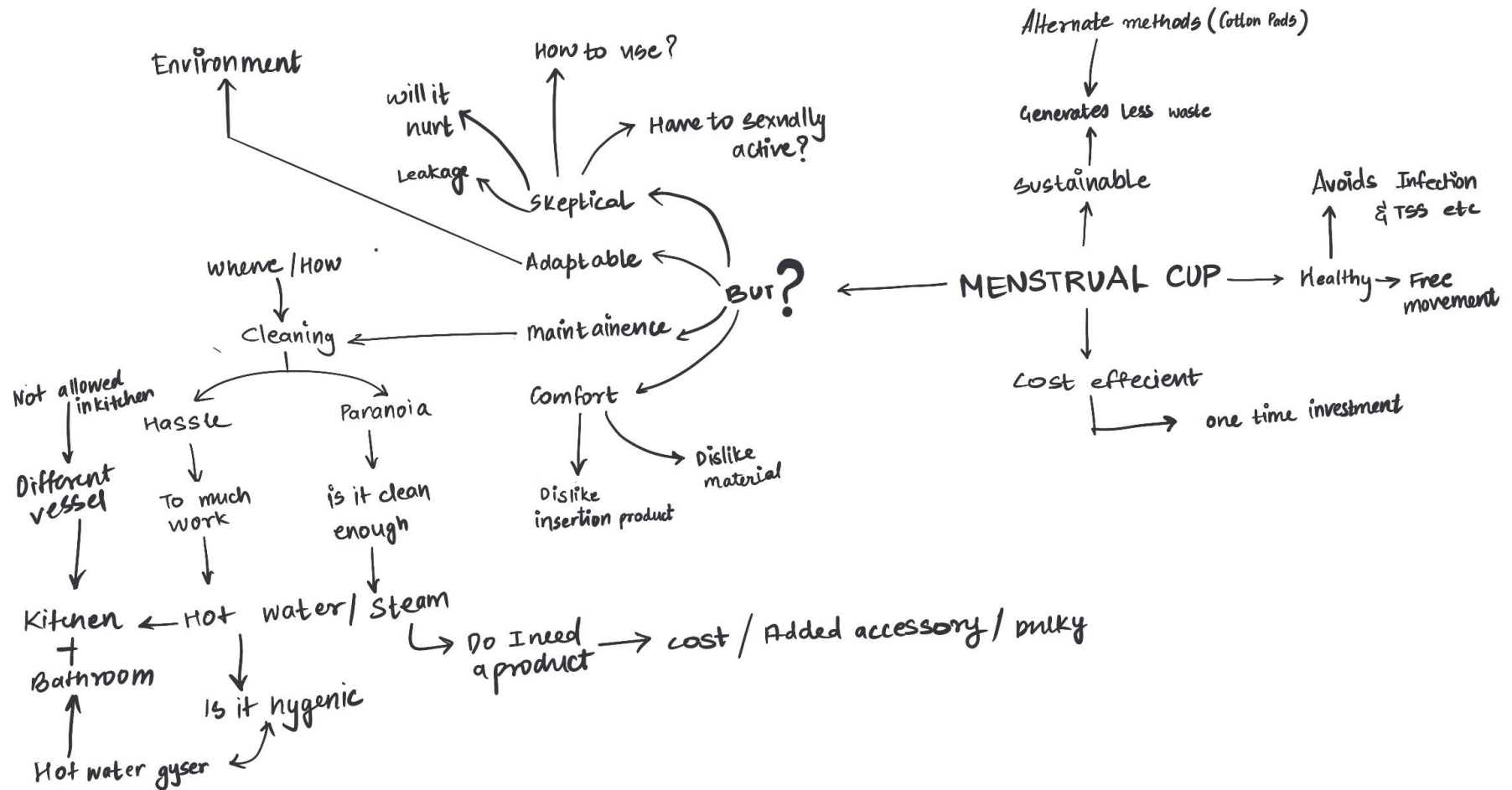


Fig. no 19 Source : Author

Chapter 04 :

Secondary Study

Secondary Study: Methods of Sterilization

4.1

Domestic Grade Sterilization



Hot water

Require a container to hold the hot water. The cup is submerged in hot water to sterilizer



Steam

The equipment generates steam in a chamber to sterilize the cup. Need electric supply



UV Rays

The equipment radiate rays in chamber to sterilize cup. Need electric supply

Popular Methods of sterilization

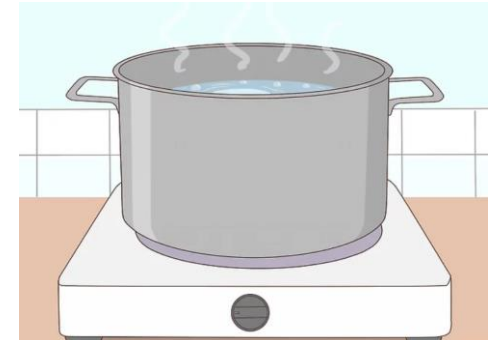
1. Let the cup sit in hot water for about 10 mins

Passive heat Method



2. Boil the cup with water for about 2 mins. & remove the cup. Prefer high temperature & quick process

Active heat Method



3. Set the time for boiling water & add cut help to sit for not more than 5 mins. Medium-low temperature is preferred.

Passive heat Method

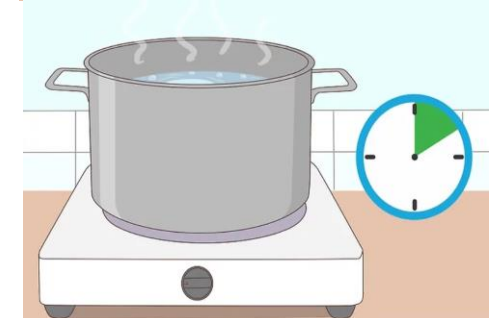
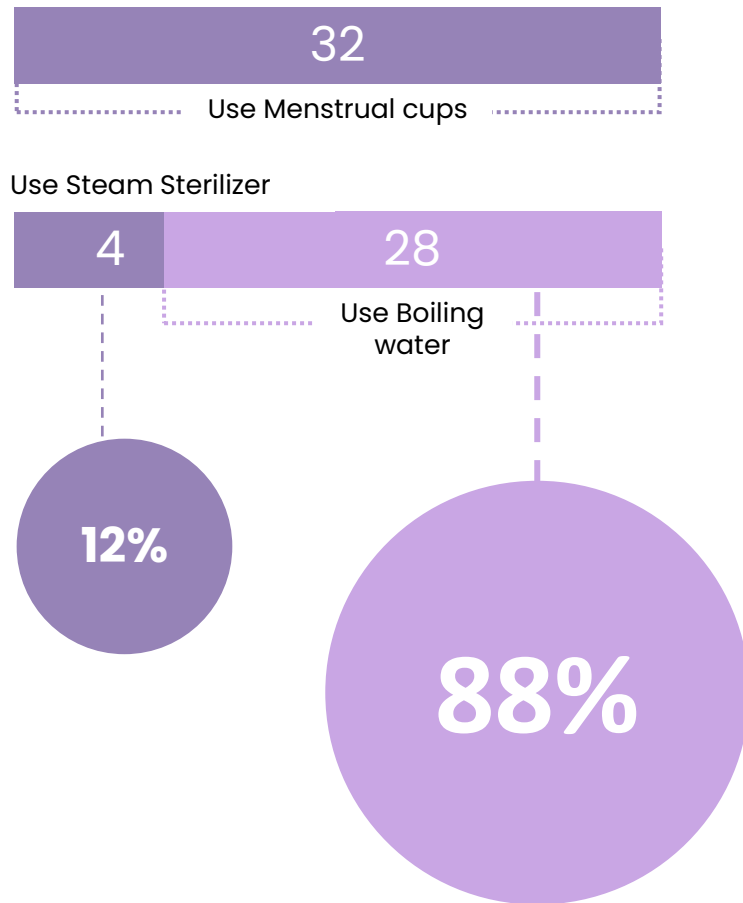


Fig. no 20 Source :<https://www.wikihow.com/Clean-a-Menstrual-Cup>

Secondary Study: Methods of Silicon Sterilization



Pros

I use separate vessel to boil & sterilize the cup

sterilize the menstrual cup in hot water in mug in bathroom

use hot water & silicon cup holder from sirona

I have separate container to store & sterilize the cup

use plastic container to sterilize & store the cup

Take hot water from kitchen & sterilize it in bathroom

Have a old flask to hold hot water to sterilize

live in hostel so use electric kettle & Mug

Cons

I once burned my hand while boiling the cup

I live in hostel & dont have access to hot water

Its not possible to sterilize cup when i am travelling

not very sure if boiling the cup is right way to sterilize.

I burned the cup during sterilizing

My family is orthodox i cant access kitchen during periods

Secondary Study: Product Analysis(Existing)



4.2



Method of Sterilization	Hot water / Microwave/Gas Stove	Steam+ Electric
Cost	250-400 Rs	1500-3000 Rs
Time Taken	10 mins	8-10 mins
Weight	10-12 gms	~350 gms
Body Material	Silicon	Mixed Polymer
Water Capacity	~ 200ml	~ 50ml

ALL PRODUCTS ARE AVAILABLE ON THE E-COMMERCE WEBSITE i.e Amazon, Flipkart etc.

Secondary Study: Product Analysis(Existing)

		
Method of Sterilization	UV Rays+ Electric	UV Rays+ Electric
Cost	4500 Rs	2250 Rs
Time Taken	3 mins	5 mins
Weight	~200 gms	~150 gms
Body Material	Mixed Polymer	Silicon +Mixed Polymer
Water Capacity	NA	NA
ALL PRODUCTS ARE AVAILABLE ON THE E-COMMERCE WEBSITE i.e Amazon, Flipkart etc.		

Secondary Study: Product Analysis(Existing)

Market Study: Understanding the product Gap

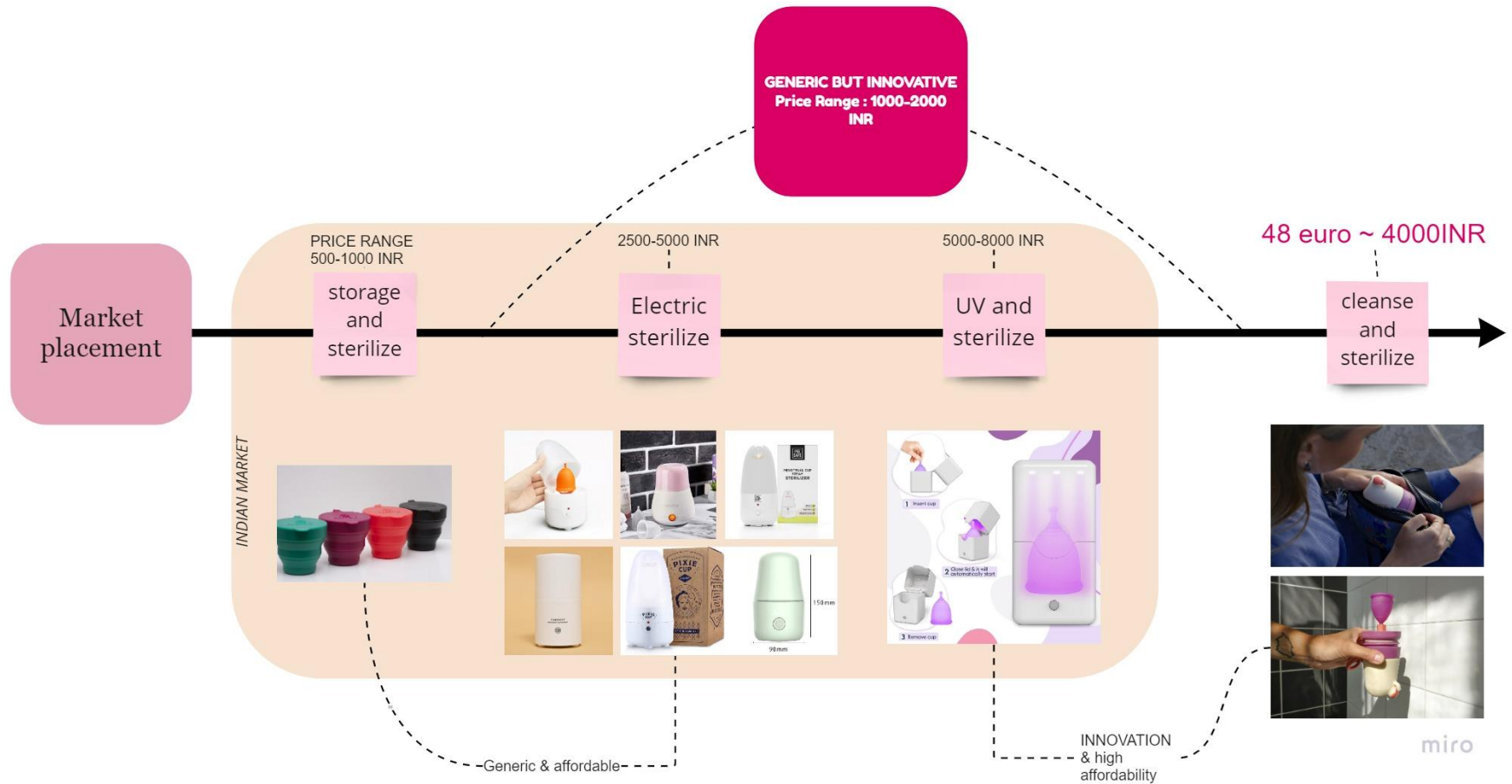


Fig. no 21 Source : Author/ Miro

Secondary Study: Product Analysis

4.3

Brand: Everteen

Technology: Steam



Fill the container
with water

Place the cup,
cover with lid &
turn on the switch

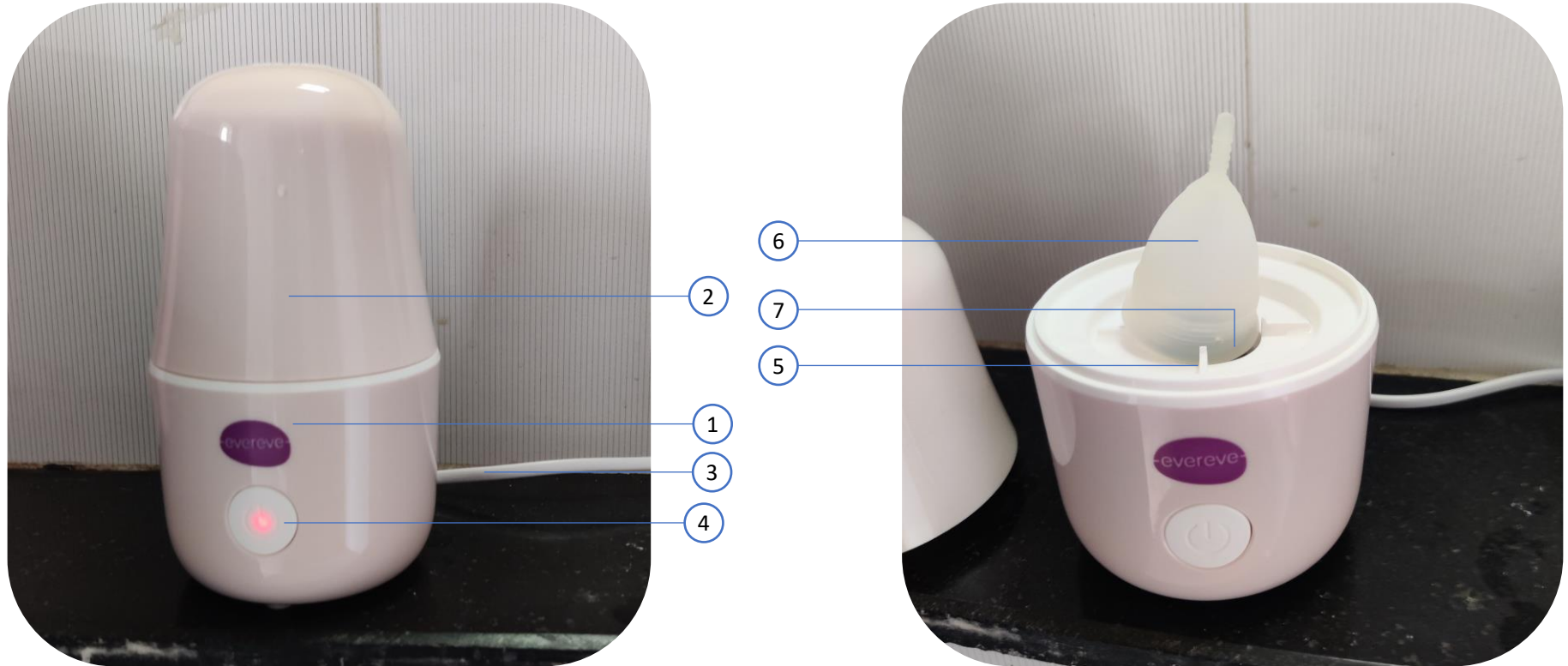
Wait for 10 mins
to sterilize. Heat
will turn off
automatically

Process



Fig. no 21 Source : Author

Secondary Study: Product Analysis



1. Base Body (with the heating circuit)
2. Upper case
3. Power source
4. Power button with indicator

5. Menstrual cup
6. Cup guard
7. Water containment area

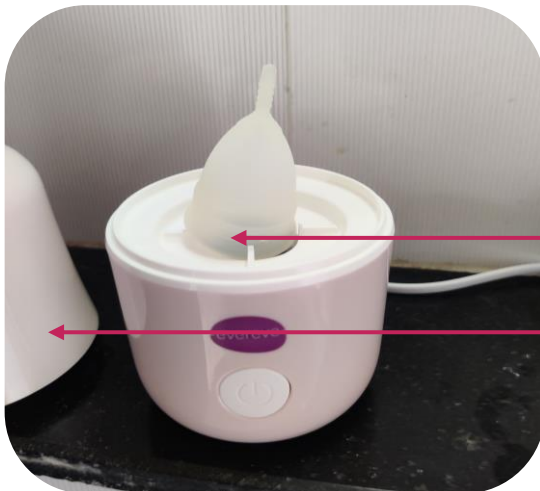
Fig. no 22/23 Source : Author

Secondary Study: Product Analysis



Can't find the plug every time.

Too much wire
Improper wire
management



Improper Placement

Lid Turns Hot due to
steam



"It is a quick process, it requires less water. The device is bulky to carry around. It's difficult to find a plug every time I want to use it"

-23yo, Student

Pain points: Accessibility,, Wire & Improper Placement

Fig. no 24/25/26 Source : Author

Secondary Study: Product Analysis

4.3

Brand: Sirona

Technology: Hot water



Fig. no 27 Source :<https://www.amazon.in/Collapsible-Silicone-Menstrual-Sterilizer-Microwave/dp/B08SKKPFTD>

Literature Review: Product Analysis



Lid is not tight enough. Pop open due to hot water steam

Small Base and unstable



Sometimes to suborn to collapse

Improper grip
Flimsy to carry hot water



“ The container is compact & easy to store. But the only issue is the lid is a bit unstable. The cup doubles as the storage container for the menstrual cup. At times it is difficult to get hot water to sterilize. If a device provides that it would be a boon ”

- 27yo, Working Professional

Pain points: Closure, stability, access to hot water

Fig. no 28/29/30 Source : Author

Secondary Study: Product Use Mapping

4.4

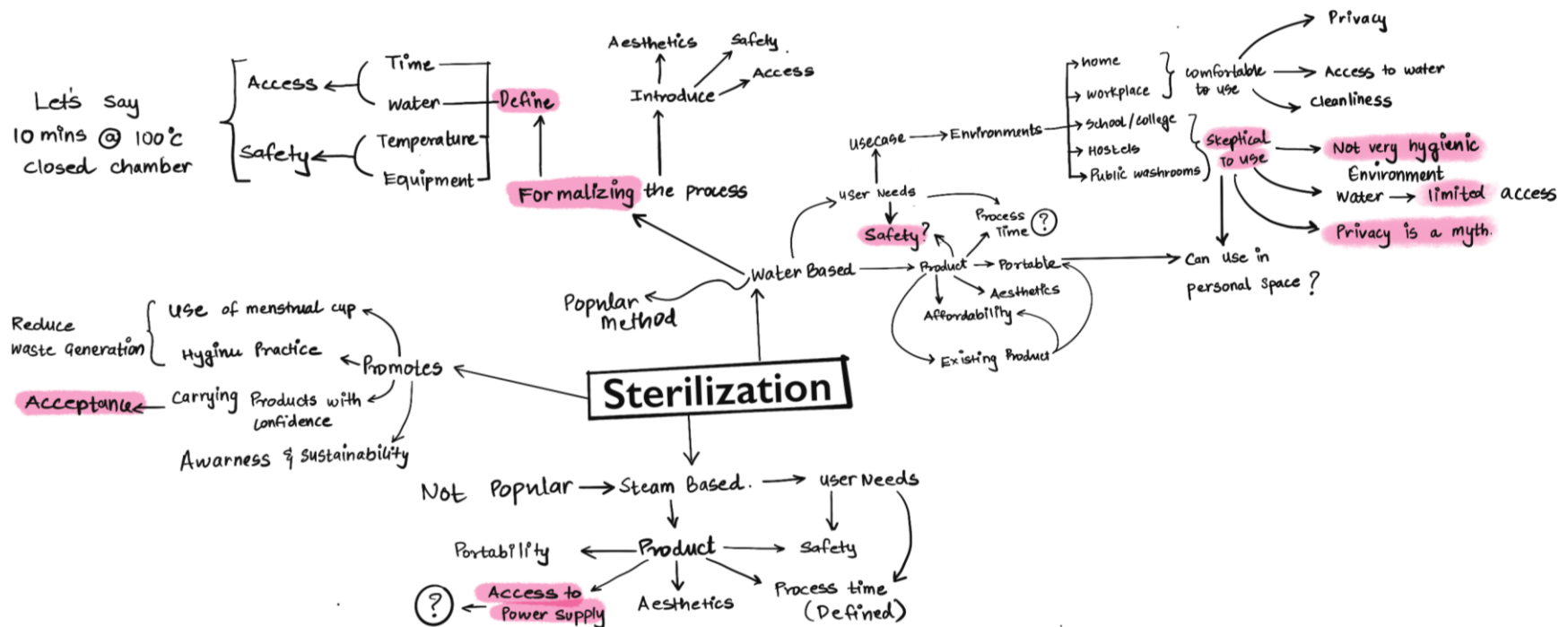


Fig. no 31 Source : Author

Chapter 05 :

Design Brief

User Persona

Mati Sharma, 27

Working professional

Mati is an entrepreneur and owns a small business that promotes sustainable products. Being an environmentalist herself, Mati prefers using sanitary pads in case of traveling or working outdoors.

Her major work involves material procurement for which she has to drive through towns. There are inadequate public restrooms & the available ones are need not hygienic. This demotivates her to use a menstrual cup.

Being a dynamic woman, Mati has always tried new things and followed the best possible option. Though using a menstrual cup is a healthy & Hygienic solution, using sanitary napkins seems a more comforting option.

Problem Statement

5.2

Menstrual cups are a revolutionary product in women's menstrual health and hygiene sector. Being reusable and affordable, it is a sustainable solution for the sanitary waste being generated per woman per cycle. It is gaining popularity amongst the youth and working-class women but still, there is a huge number of women who are skeptical about it. Menstrual cups are also receiving a positive response from women in urban and rural areas as it is low cost and low-maintenance. Despite being a reformative product, certain issues have to be addressed to increase engagement and user numbers.

1. Menstrual cups are reusable, and thus require a process of cleaning and sterilizing after every use. Many women find the process tedious and thus skip the steps.
2. In the current scenario, most of the users are working women; who have to travel and be on foot all day. It is difficult to find clean public washrooms for the changing and cleaning of cups. An unhygienic environment demotivates women to use cups.
3. Sterilizing the cup after use is an important step, but it is nearly impossible when traveling or in places

4. where women cannot find clean restrooms. This is also an issue for women using cups in rural areas where they ignore the hygiene factor.
5. The current sterilizers in the market are bulky and expensive. Not every woman using a cup can afford a sterilizer and those who have do not carry it as it does not travel-friendly.
6. The affordability range of the Menstrual cup sterilizer is saturated. There is huge scope in product development



Fig.no.32. Source: <https://www.google.com>

Design Brief

5.3

PROPOSED DESIGN BRIEF

Design a menstrual cup sterilizer catering to the user which is Portable, affordable, lightweight, and low maintenance

Objective

1. Promote and encourage women to practice sustainable menstrual practices.
2. Make people aware of hygiene issues and address the confusion by making the process simple.
3. Solve the sterilizing and storage issues put forward by current Menstrual cup Users.

User-specific

1. The product should Cater to the target user of age 25-35yo.
2. Since the target demographics are mostly working so the product has to be portable, compact, and lightweight & travel-friendly to be carried in handbag. The device should be Product affordable and low maintenance.
3. The product should lower the hassle of sterilization & storage of menstrual cup

Use - case specific

1. The device should use water as the medium of sterilization
2. The device should be watertight & leakproof.
3. Devices should withstand at least IP65 grade standards.
4. As the product has to be portable the power source should be portable i.e. batteries or rechargeable battery pack.
5. The safety terms to be considered with the handling of the device i.e electric shock & hot water burn
6. The product should be used as a storage container after the process of sterilization.

Manufacturing specifics

1. The water temperature will range from 80-100°C, thus the material should withstand the temperature without tampering. Polymers like ABS or PPE can be used.
2. Power sources can be changeable or rechargeable, considering the device would be used for an average of 20 mins.
3. The device should avoid heat & water loss during the process.
4. The product form should be easy to clean & maintain.
5. Any material details which tend to rust or deform in contact of water to be avoided

Chapter 06 :

Ideation

Ideation Stage 01: Form & Style Board

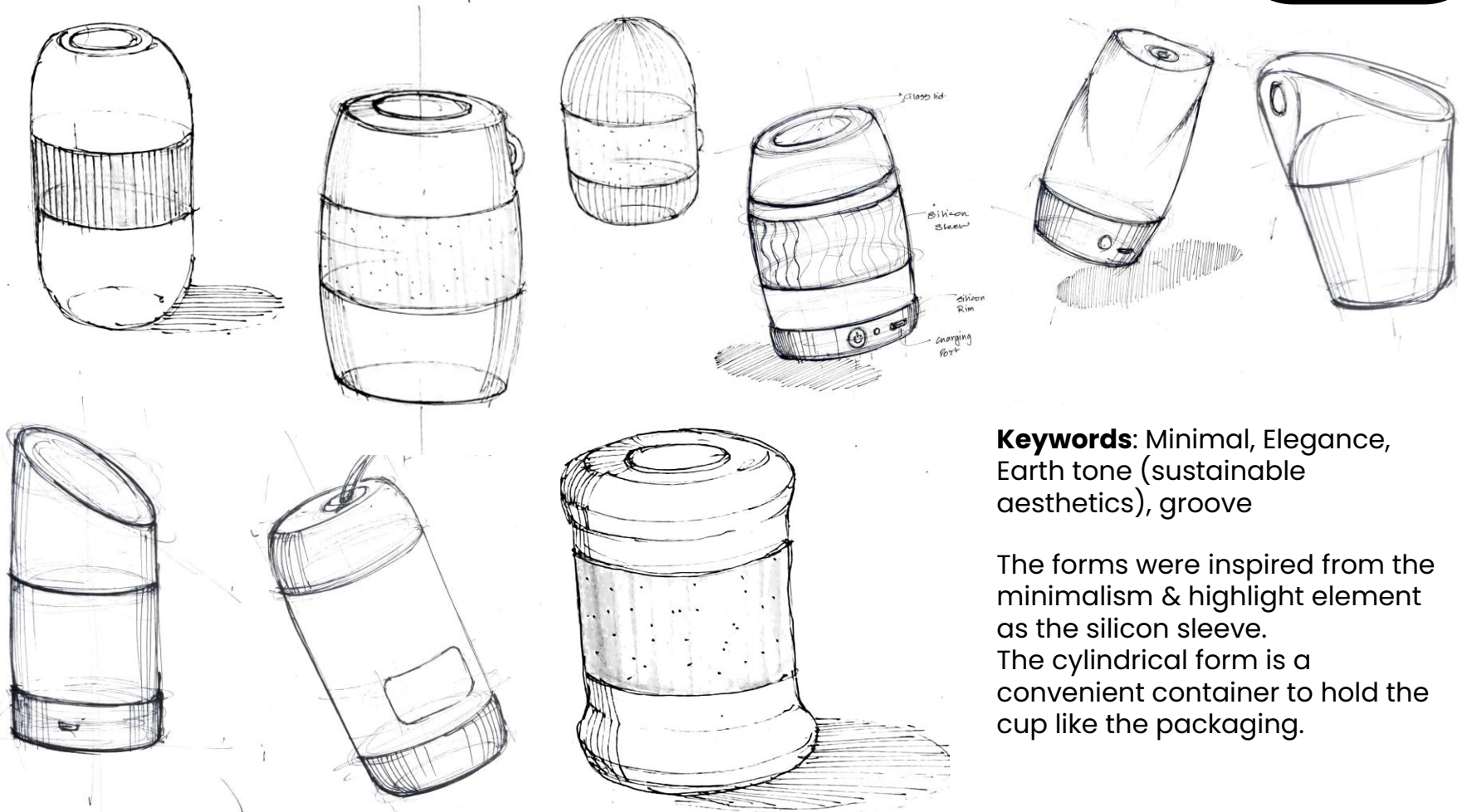
6.1



Keywords: Minimal, Elegance, Earth tone (sustainable aesthetics), groove

Ideations: Form Generation 01

6.1.1

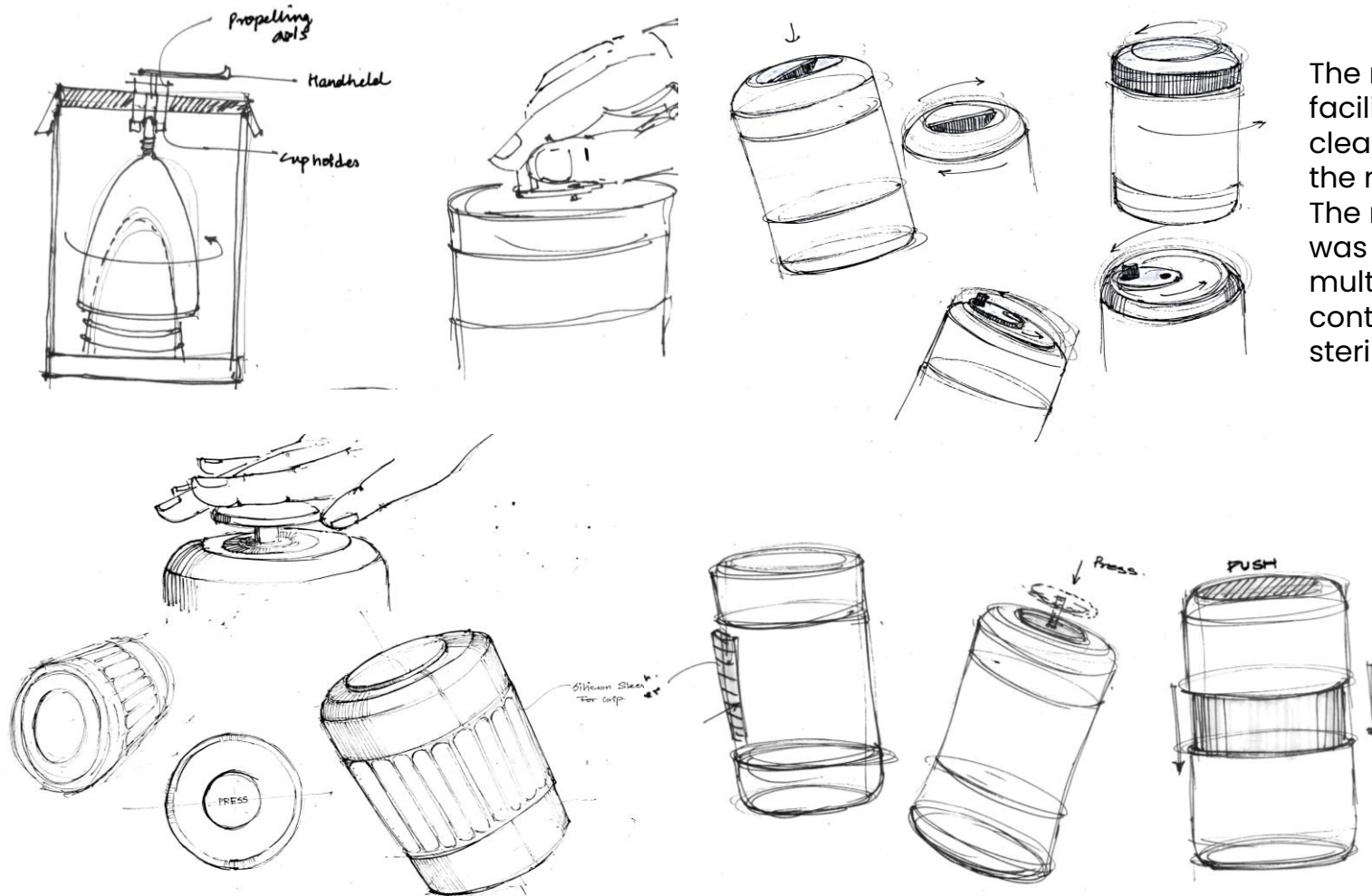


Keywords: Minimal, Elegance, Earth tone (sustainable aesthetics), groove

The forms were inspired from the minimalism & highlight element as the silicon sleeve. The cylindrical form is a convenient container to hold the cup like the packaging.

Ideations: Mechanism Generation 01

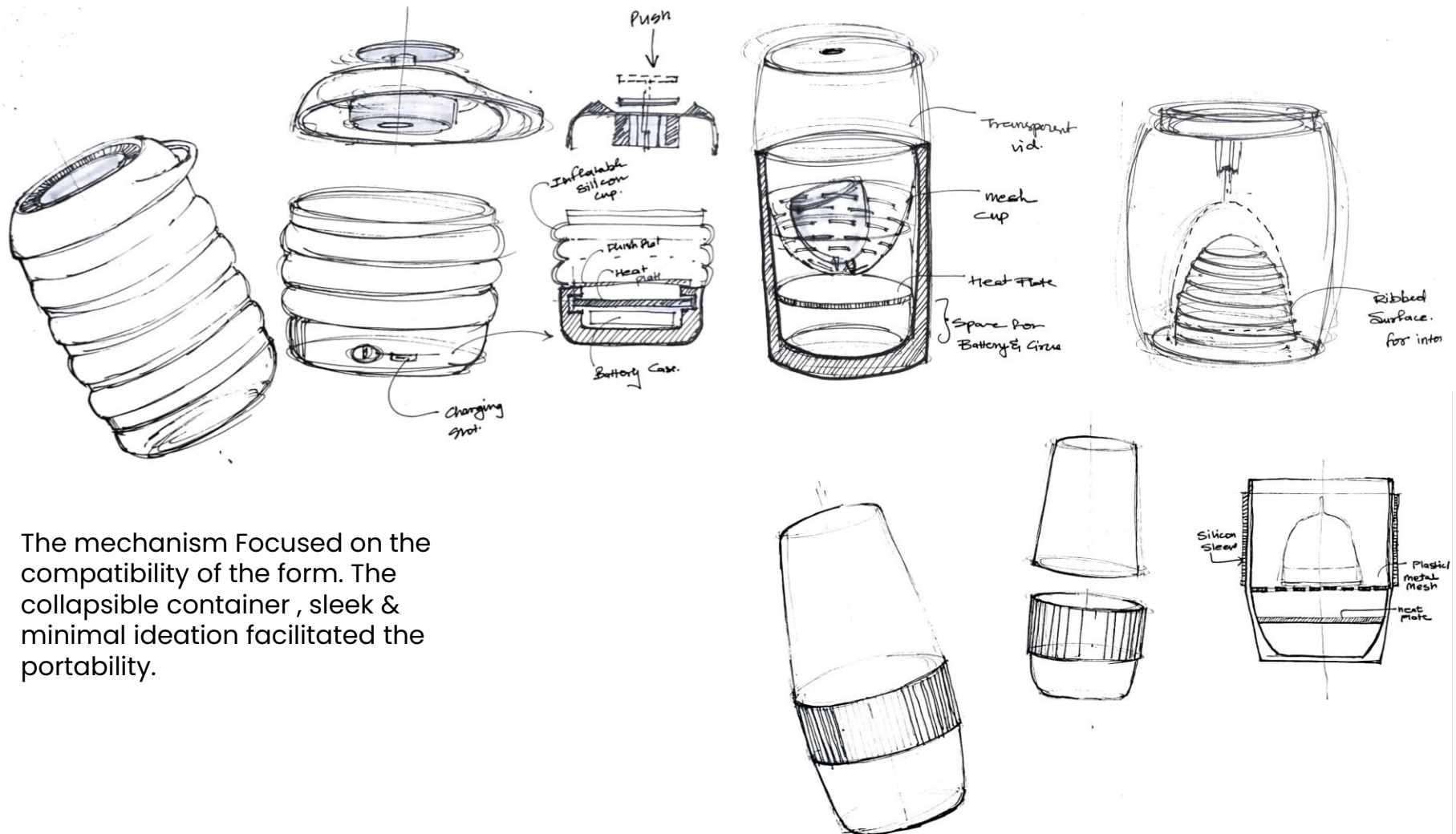
6.1.2



The mechanism facilitates the cleansing action of the menstrual cup. The main agenda was to provide the multipurpose container to cleanse, sterilize & store.

Ideations: Mechanism Generation 01

6.1.2



The mechanism Focused on the compatibility of the form. The collapsible container, sleek & minimal ideation facilitated the portability.

Ideations: Mock Up rig

6.1.3

Involving Kinaesthetic to understand the **placement of the product in the environment**.

Observation :

- The mechanism intended in the proposed ideas needs two-hand operations.
- It is difficult to manage the product and the process of cleaning the public restrooms.
- It is difficult to operate the cleansing process in a squatting position.
- The mechanisms proposed can be optimized for sterilizing the menstrual cup

Inference :

- The mechanism intended for the cleansing can be eliminated, as it is adding strain to the process not assisting it.
- Cleansing can be done easily by conventional methods i.e washing cups under running water.
- The concept of heating can assist in sterilizing but can only provide boiled water for cleaning in unhygienic conditions.



Fig. no 33 Source : Author

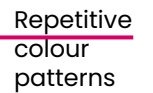
Ideations: User centric approach

6.2

After the Generation 01 approach of Ideation, the proposed mechanism and from were found to be unrelated to the users. The mechanism doesn't support the process rather add on to the hassle.

The Generation 02 of Ideation is more user centric approach. It begins with the mood board of product used by the women to understand the pattern of purchase. This may help to derive more relatable as well as novel product.

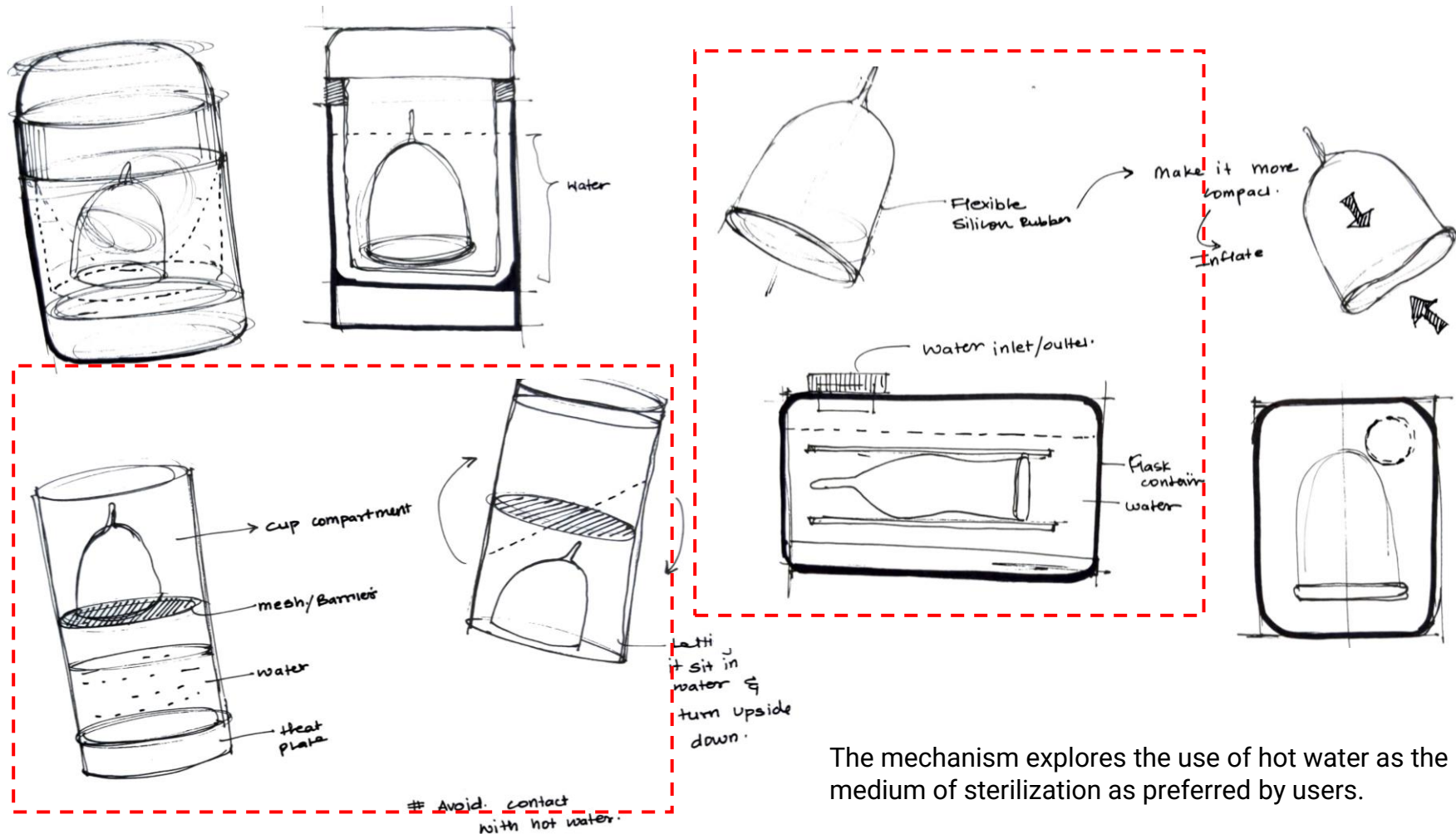
6.2.1



61

Ideations: Generation 02

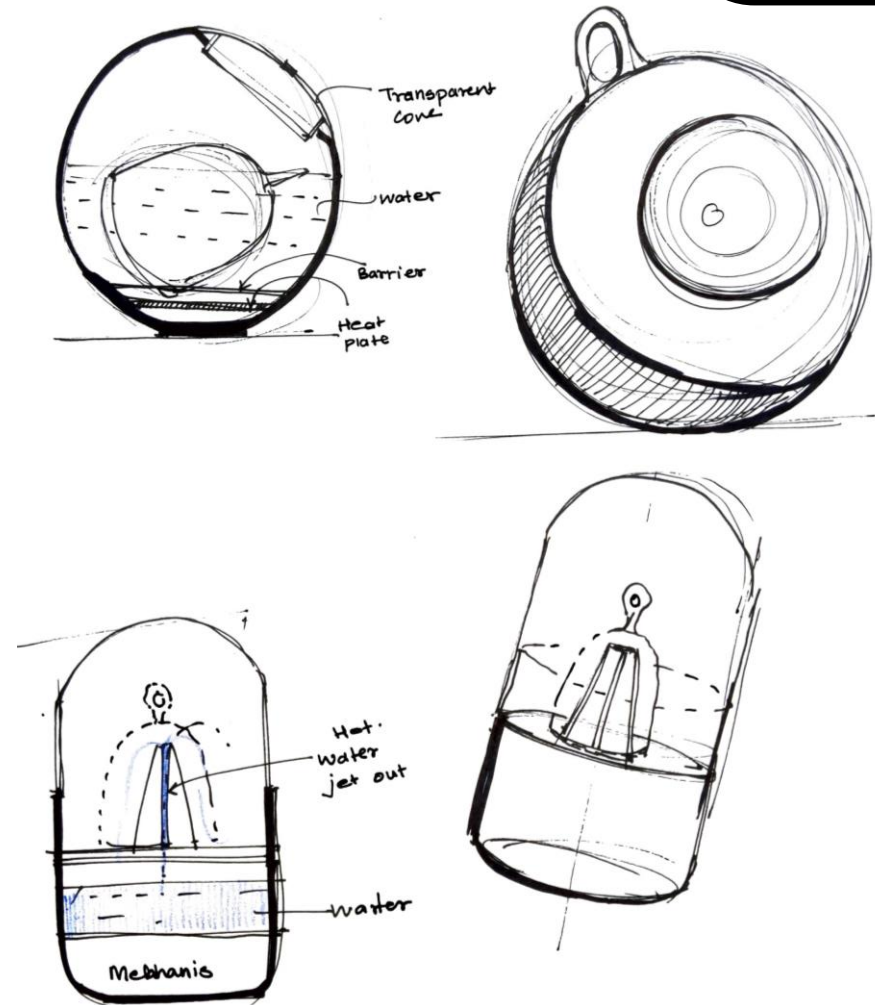
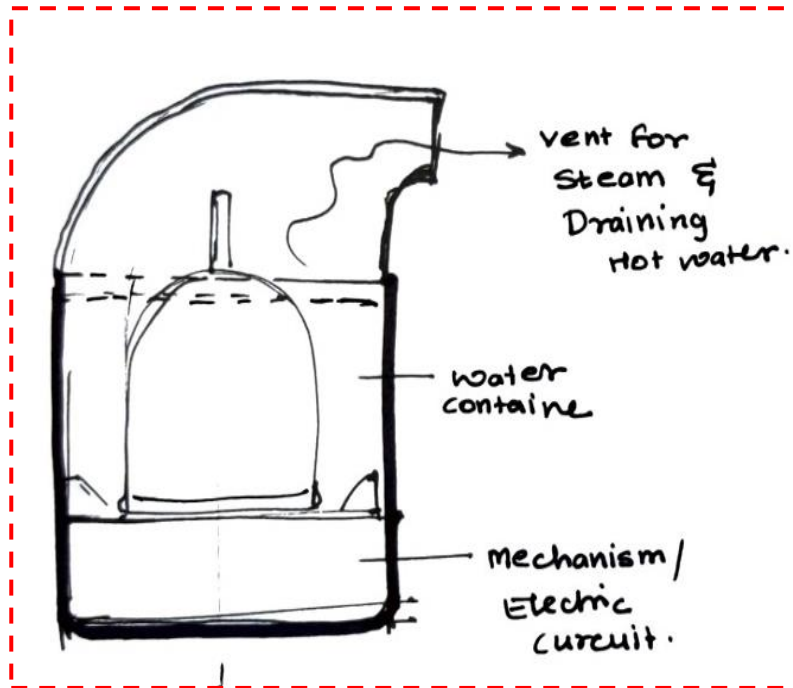
6.2.2



The mechanism explores the use of hot water as the medium of sterilization as preferred by users.

Ideations: Generation 02

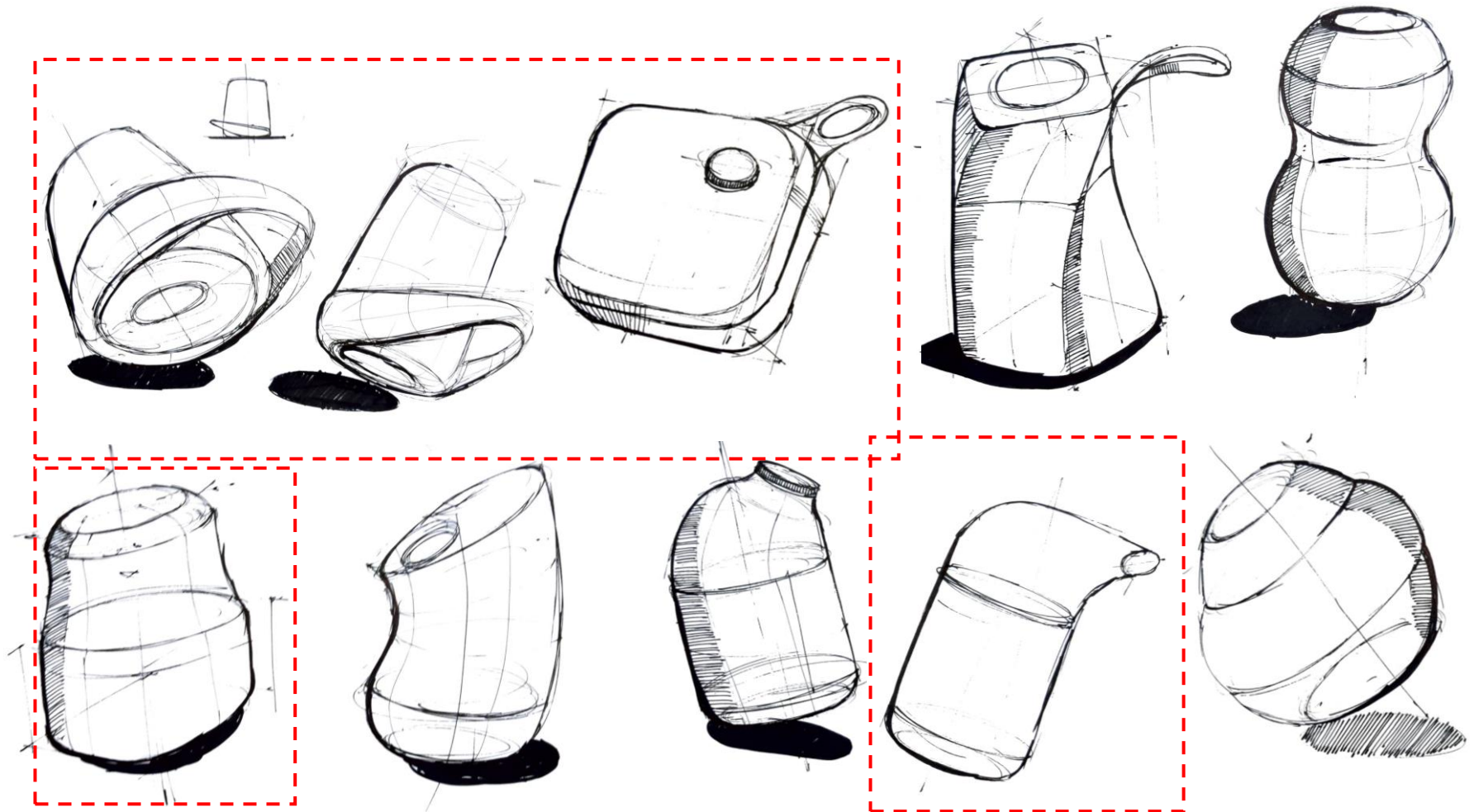
6.2.2



The mechanism explores the use of hot water as the medium of sterilization as preferred by users.

Ideations: Form Generation 02

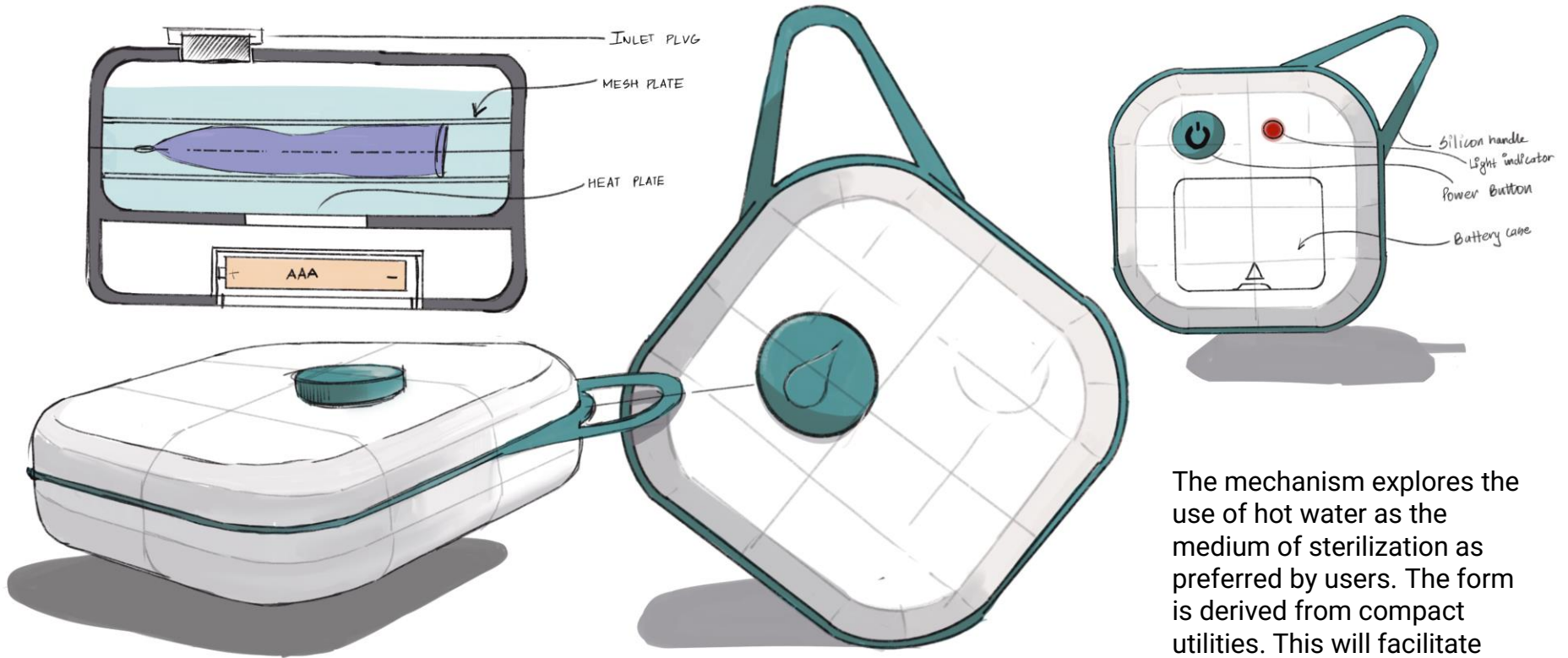
6.2.3



Chapter 07 :
Concept
Development

Concept Development: option01

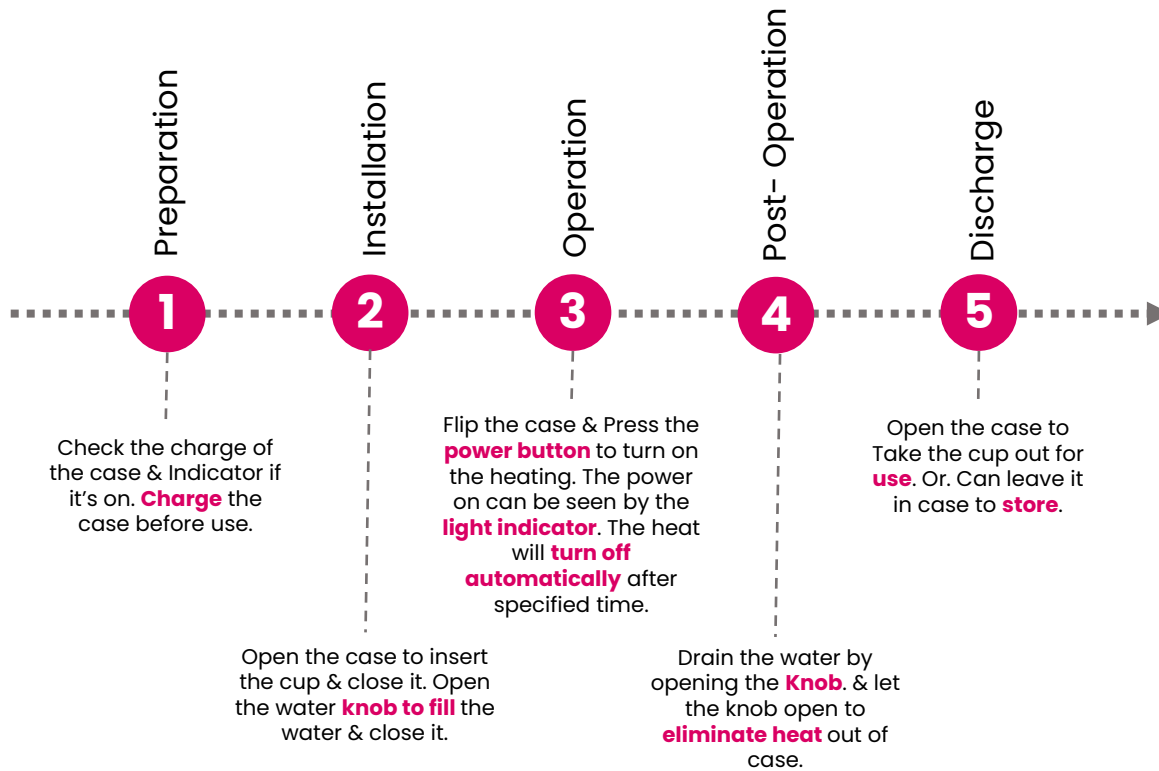
7.1.1



The mechanism explores the use of hot water as the medium of sterilization as preferred by users. The form is derived from compact utilities. This will facilitate carrying in small bags & can come in handy.

Product Interaction

Process Chart

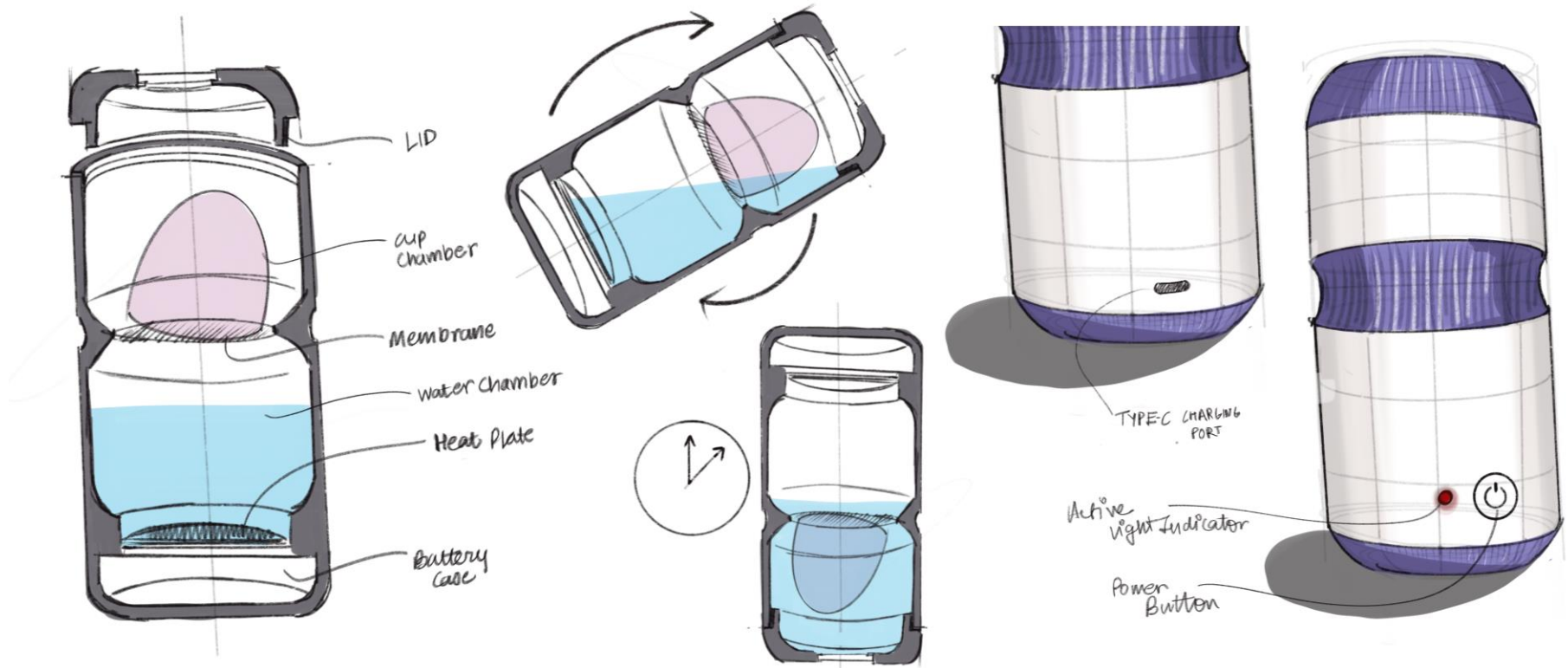


Features

- Method of sterilization: Active water heating
- Temperature range: Approx 80-100°C
- Power source: Lithium-ion batteries
- Est. dimension: 100x100x400mm
- Est. time: +/-300(s)

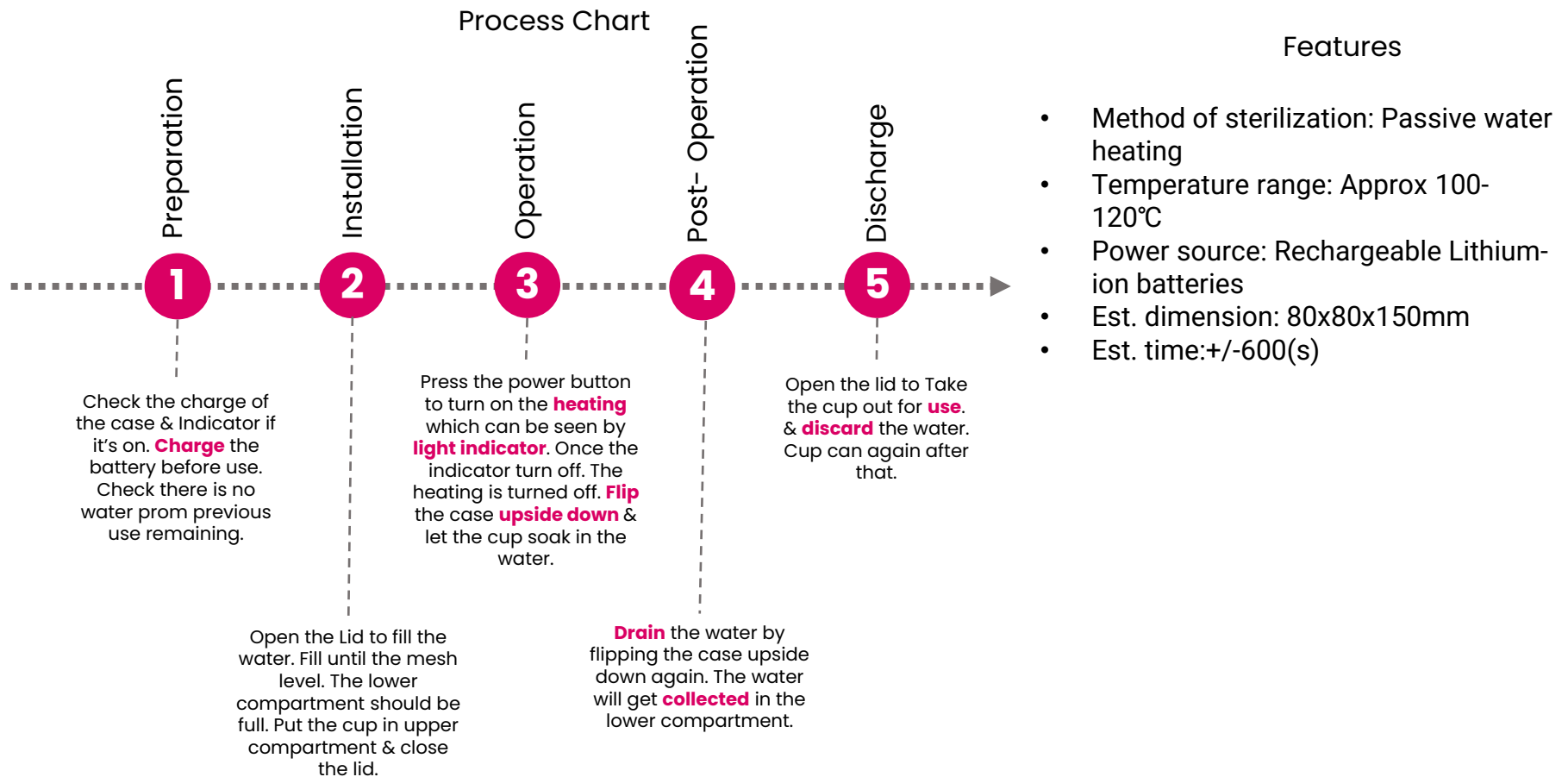
Concept Development: option02

7.1.2



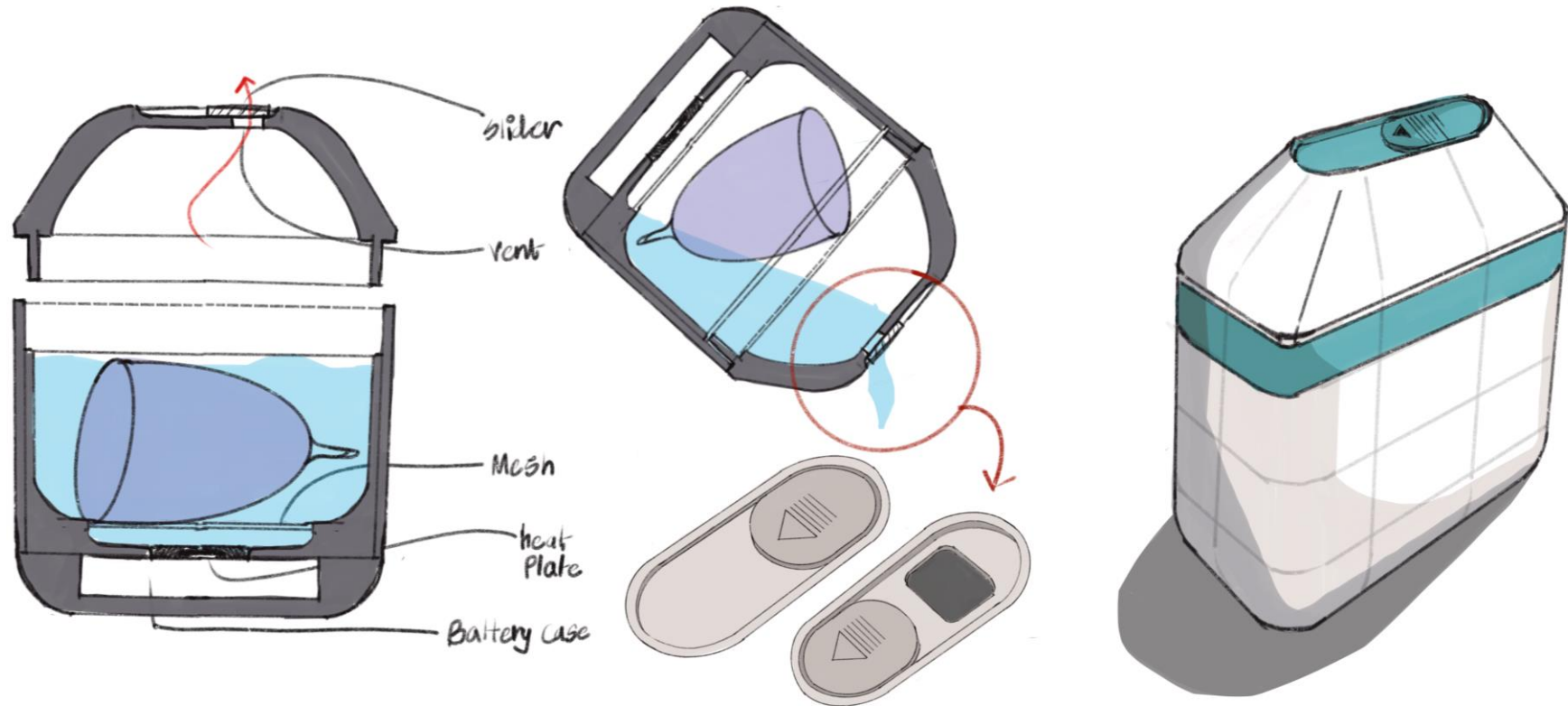
The mechanism explores the use of hot water as the medium of sterilization as preferred by users. The form is derived from the issue of water burns. The concept helps avoid contact with hot water after sterilization.

Product Interaction



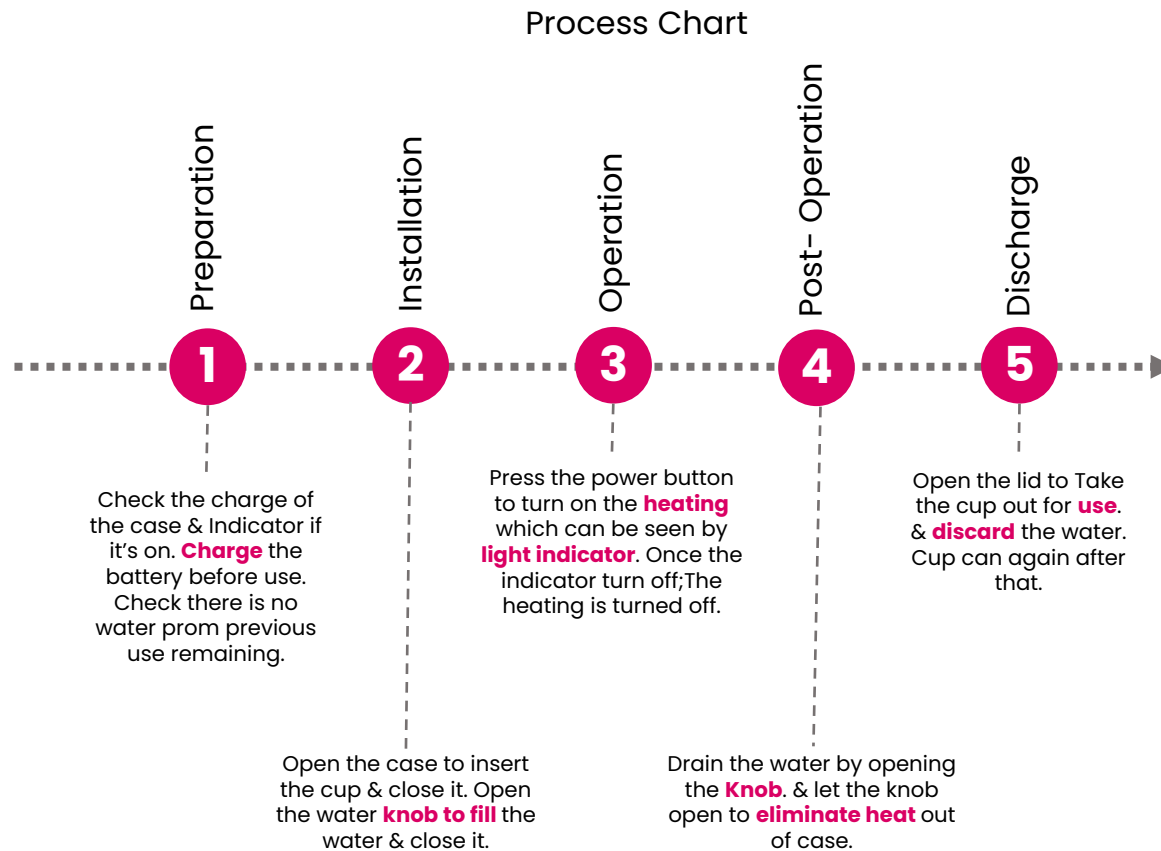
Concept Development: option03

7.1.3



The mechanism explores the use of hot water as the medium of sterilization as preferred by users. The form is derived from the issue of water burns. The concept helps avoid contact with hot water after sterilization by draining the water. Also provides a sterilized enclosure to store the cup. C

Product Interaction



Features

- Method of sterilization: Active water heating
- Temperature range: Approx 80-100°C
- Power source: Lithium-ion batteries
- Est. dimension: 100x100x400mm
- Est. time: +/-300(s)

Concept Development

7.2

	FORM	SIZE	METHOD	UI	TIME	PORTABILITY	CMF	POWER SOURCE
CONCEPT 01								
CONCEPT 02								
CONCEPT 03								

Concept 01

This concept is most liked. The key aspects of the concept is the novel form, cmf, portability & User interaction.

Concept 02

This concept is not liked the concept. But there certain aspects of the concept are the novel function and Power source

Concept 03

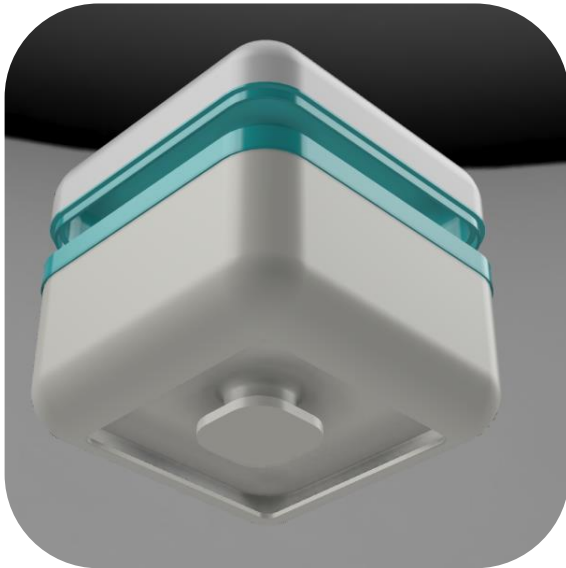
This concept is the second most liked. The key aspects of the concept are the novel form, method, UI & Power source.

Chart. 18.. Source: Author

Concept Development

7.3.1

Final Concept : Concept 03



As the proposed battery electrical circuit is not possible. The power is driven through plug & electrical point. The cavity at the bottom coil the power wire. The cubical form depicts a minimal approach.



The Knob at the top will provide the easy inlet & draining outlet for water. This avoids contact with hot water during the process.



The container is a double layer. By creating a vacuum space between the two shells, heat transfer can be avoided. This eventually will make the product easy to handle.

Fig. no 34/35/36 Source : Author

Concept Development

7.3.2

Final Concept : Working Rig



List of components

1. Power plug
2. Wire
3. Connecting wires
4. Thermostat (KDS 301 155degrees)
5. Switch
6. Heat plate
7. Light indicators

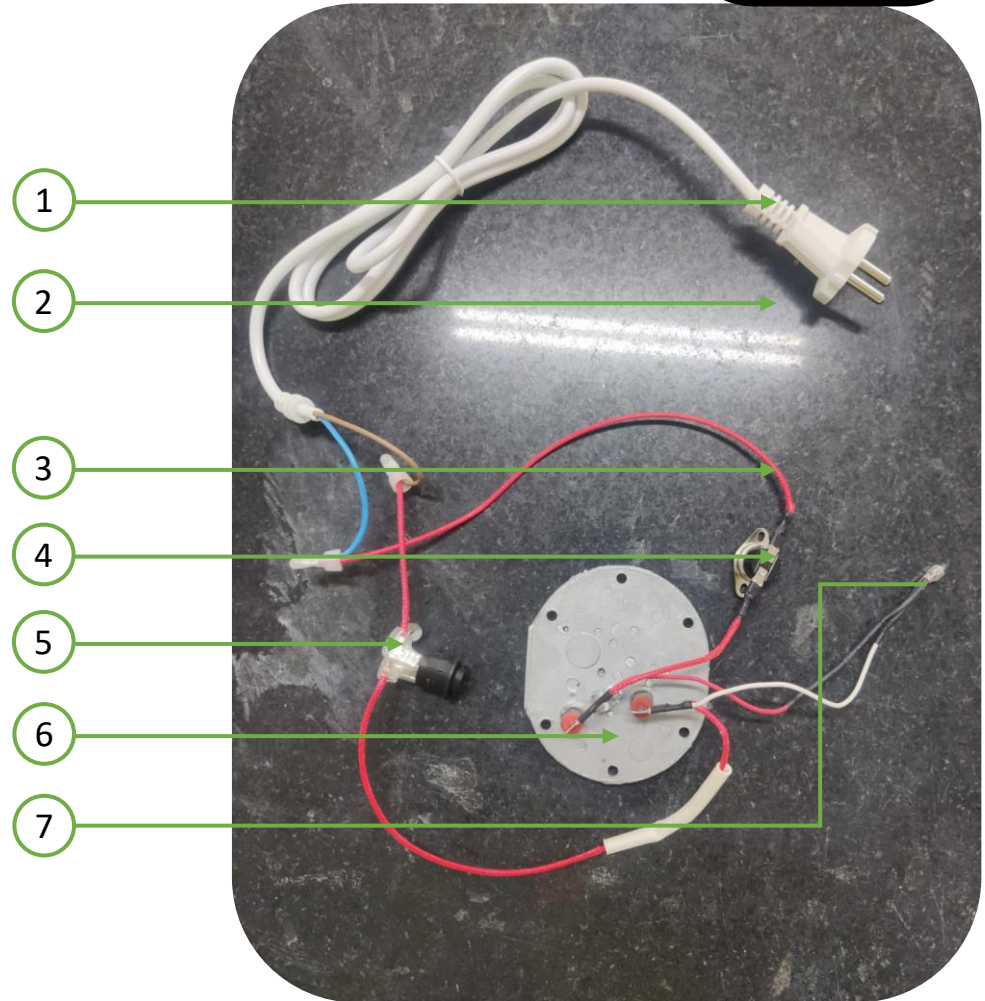


Fig. no 37/38 Source : Author

Concept Development

7.3.3

Final Concept : Mockups



The initial mock-up was made as a concept. The flat form is flat & wide open. The knob & hole on the top is wider. The form was proposed to contain compact battery circuit.

The Final mock-up was made as a concept had incorporated the practicality of the heating circuit. The power source cannot be the battery pack, hence need to derive power from the electrical plug. This adds to the volume at the base of the case to store the wire.

Fig. no39/40/41 Source : Author

Concept Development

7.3.4

Final Concept : Surface Development



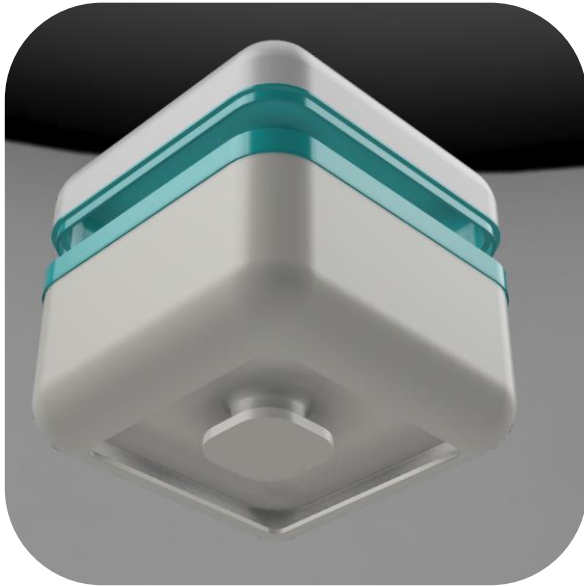
To explore the form. The shells were first carved on clay tiles. The tiles are later dried and set to cure. Once cured the tiles are used as die for Styrene vacuum forming.

Fig. no 42/43/44 Source : Author

Concept Development

7.3.5

Final Concept : Concept 03 Setbacks



The wire chamber at the bottom increases the volume of the case.



The Knob at the top adds on the steps involved in the process. Failing to monitor the knob can lead to product exhaustion. Also, the knob has to be left open during the process of boiling water to vent the steam out.



The case opens horizontally, which means it has a wider opening. The wider the opening more it is susceptible to leakage. It won't pass the IP ratings.

Fig. no 34/35/36 Source : Author

Chapter 08 :

Product Development

Product Development

Device Specifications

- Application: Active heat sterilization
- Power Input: 200 W
- Product dimension: Approx. 1300x800x600mm
- Proposed circuit dimension: (Subjected to change as per circuit build-up)
- Battery type: Power Plug
- Switch Type: Button Type (Tactile)
- Indicator: LED
- IP Rating : IP65

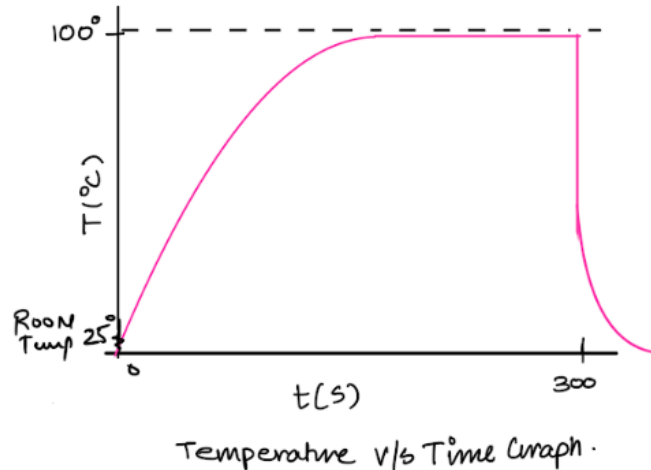
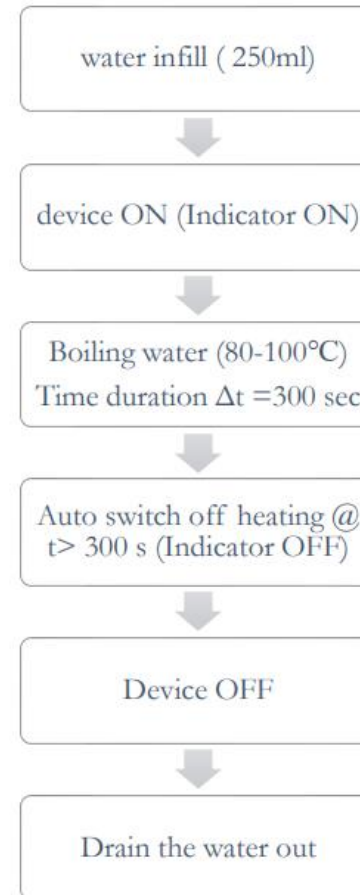


Chart. no 19 Source : Author



Process Chart

Chart. no 20 Source : Author

Product Development

8.2

Revised Design Brief

Use – case specific

1. The device should use water as the medium of sterilization
2. The device should be watertight & leakproof.
3. Devices should withstand at least IP65 grade standards.
4. As the product has to be portable the ~~power source should be portable i.e. batteries or rechargeable battery pack.~~ **The required power range is 200-400W cannot be achieved by li-ion batteries. Thus, need wire management.**
5. The safety terms to be considered with the handling of the device i.e electric shock & hot water burn
6. The product should be used as a storage container after the process of sterilization

Manufacturing specifics

1. The water temperature will range from 80-100°C, thus the material should withstand the temperature without tampering. Polymers like ABS or PPE can be used.
2. Power sources can be ~~changeable or rechargeable,~~ **(The power source is the electrical plug)** considering the device ~~would be used for an average of 20 mins.~~
3. The device should avoid heat & water loss during the process.
4. The product form should be easy to clean & maintain.
5. Any material details which tend to rust or deform in contact of water to be avoided.

Product Development

8.3

Revised Concept

Press the cup & put it in the mesh plates in the lid of the sterilizer.

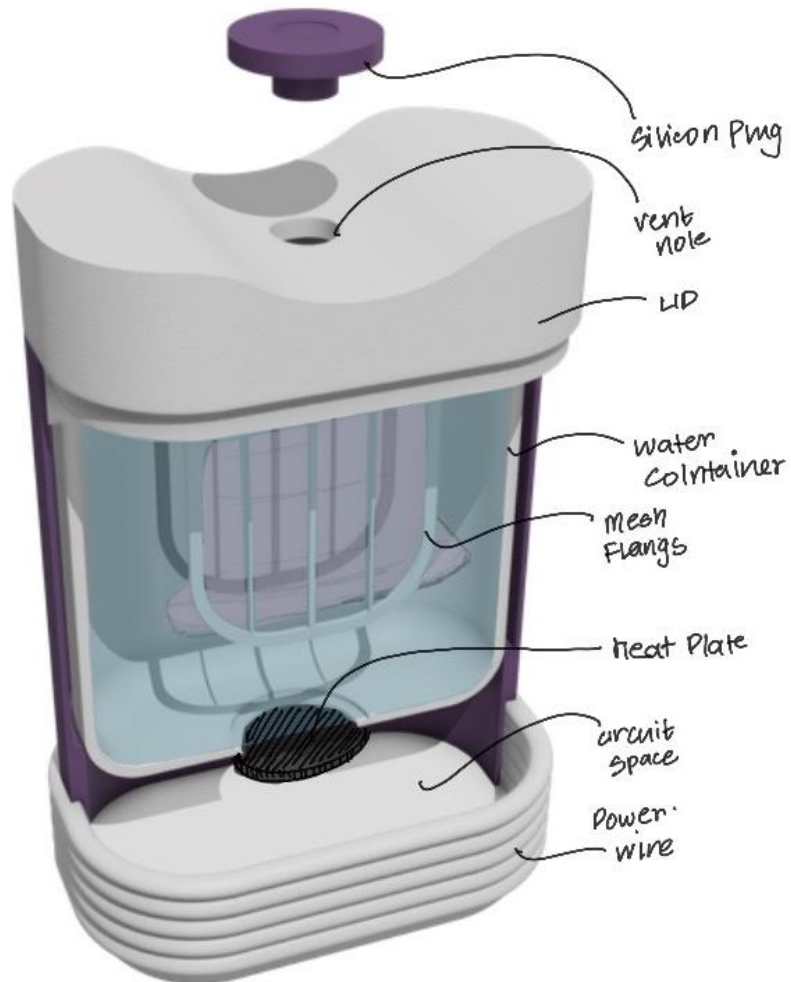
Fill the water in the case & close the lid.

Turn on the device & let the water heat & sterilize the cup

Turn off the device & take out the lid to use the cup.

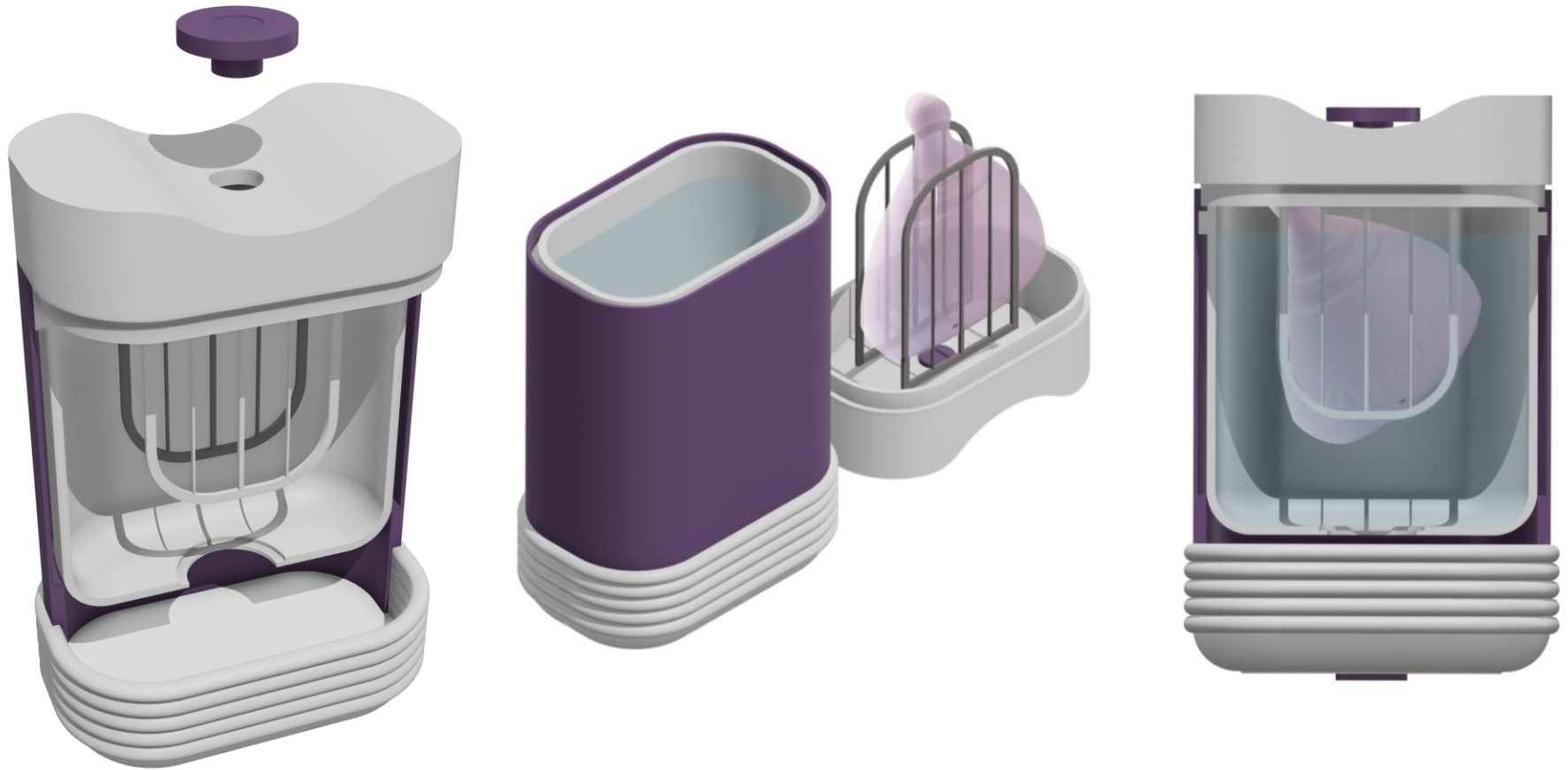
The final Concept is derived from the previous concepts 01 & 03. The compact form & less complicated interaction. There is a narrow opening that can be controlled for leakage. The plates in the lid avoid contact with hot water during the process .

Revised Concept



The wire is coiled around the case forming an element of the design. The plug is encased at the bottom. This will reduce the wire casing space at the bottom & keep the product compact.

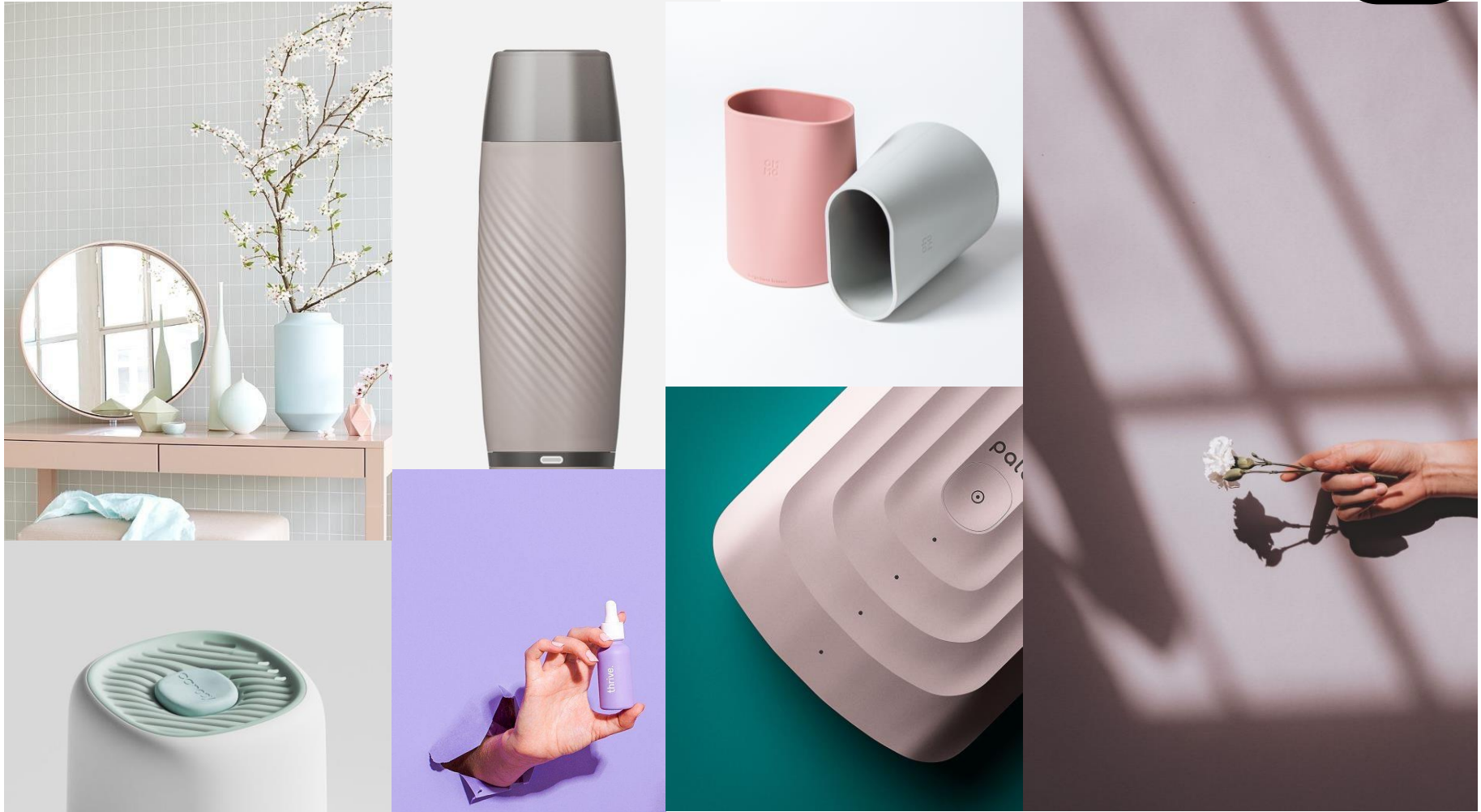
Revised Concept



3D visualization of the concept (Sectional Views)

Product Development : Style Board

8.4



Keywords: Chic, Elegance, Patterns, Pastels

Product Development : 3D Renders

8.5



Product Development



Product Development



Product Development : Product Pictures

8.6



Chapter 09 :

Challenges & Learnings

The project was an eye-opener for me. As a designer, it is crucial to understand the user and user behavior regarding the product. The menstrual cup in itself is a relatively new product in the market and for users to adapt to the new product is a challenge. This project helped to understand the relationship of a product with a user through the concept I would like to call A3.

A3 stands for adaptability affordability & accessibility and how it affects the market of the product. For a particular product, the A3 defines its novelty and marketability whether it will lie in the range of generic or luxury. The more the product becomes generic more the masses it will cater to. The more the product becomes innovative & novel more it becomes a luxury. The dynamics change when the affordable product is not adaptable or accessible or vice versa. Easy accessibility to high-affordability products can make them more adaptable.

For a product like a menstrual cup sterilizer, which would become a need and lifestyle accessory, the market is currently divided. There are very few products available to choose from. The design defines that it should cater to the masses or become a lifestyle product.

This project also gave an overview of Indian women & choice of products for self-care in different economic strata. How they have been ignoring their basic health & hygiene needs just because they are conditioned to surpass the inconvenience by ignoring it.

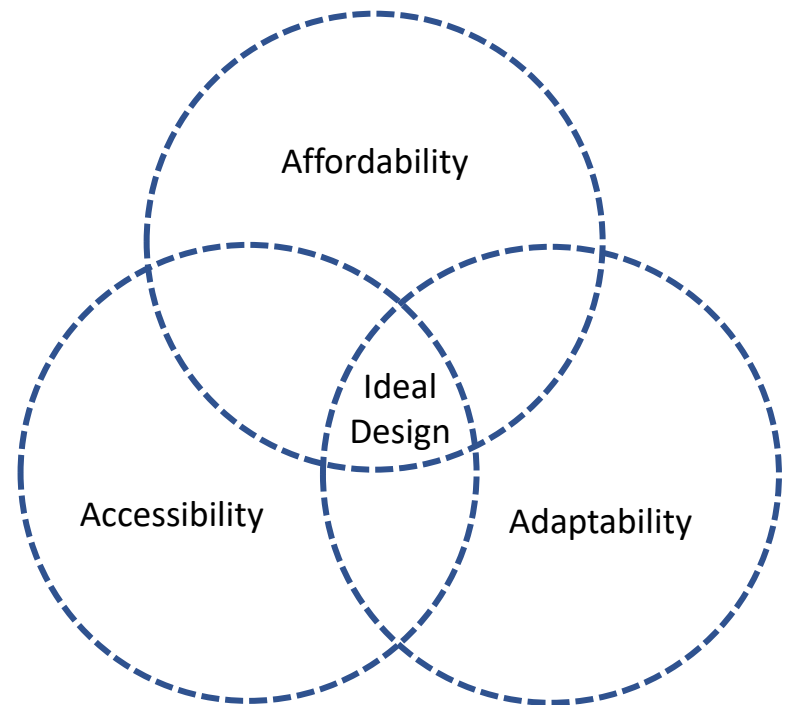


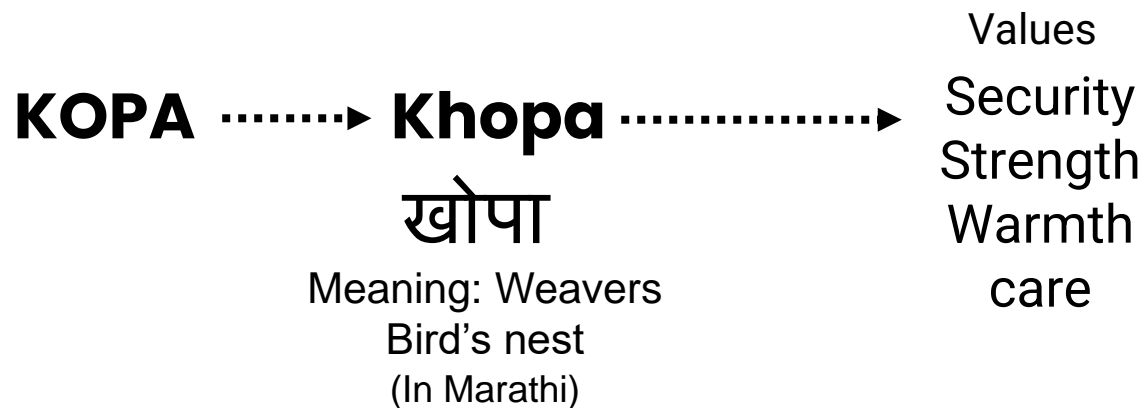
Chart. no 21 Source : Author

Chapter 09 :

Miscellaneous

Miscellaneous: Brand Identity

10



The values describe motherly nature. The topic of menstruation is highly connected to the mother-daughter relationship i.e. Mother guiding her daughter to womanhood. Thus, the values of the brand focus on caring for & supporting women through their pain and womanhood.

Brand Identity

Font :



Appendix: Consent form

Informed Consent Form for study on the use and sterilization of menstrual cup.

Respected Participant,

Thank you for your participation, Shivani Mule, in collaboration with IDC School of Design IIT Bombay, are working on a research project to understand the use and sterilization of menstrual cup adopted by women. This project is part of a semester project

This study will have three stages. In the first stage, you will be interviewed to understand your basic perception of use of menstrual products and especially the use of a menstrual cup. the issues related to using the cups and inconveniences faced during sterilization of the cups.

In the second stage, your interview is interpreted to understand the issues and derive the design ideas.

In the third stage, an empathy diagram tool is used to organize your ideas and data.

No other data will be collected from you. The collected data will remain completely confidential and will be used only for research purposes. We hope to publish the results of the analysis in the form of a design project. We assure you that the data will be treated with the utmost confidence, and your identity will not be disclosed in any form at any stage of the study or afterward. All data collected will be deleted after analysis.

Your participation is completely voluntary. You may withdraw from the study at any point in time.

This study does not involve any reimbursements. If you have any questions at a later date you may write to irb@ircc.iitb.ac.in If you have read every point above and want to continue to participate in the study, please sign below.

Date:

Signature

Reference

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