

# ELANEER

NATURAL WATER COOLER



by

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## 1.3 – Green Energy

### 1.3.1 – Green Energy

Green energy is energy that is produced in a manner that has less of a negative impact to the environment than energy sources like fossil fuels, which are often produced with harmful side effects. “Greener” types of energy that often come to mind are solar, wind, geothermal and hydro energy. There are several more, even including nuclear energy, that is sometimes considered a green energy source because of its lower waste output relative to energy sources such as coal or oil.

### 1.3.2 – Green Design

Green design is to develop more environmentally benign products and processes. The application of green design involves a particular framework for

- considering environmental issues
- application of relevant analysis and synthesis methods
- a challenge to traditional procedures for design and manufacturing

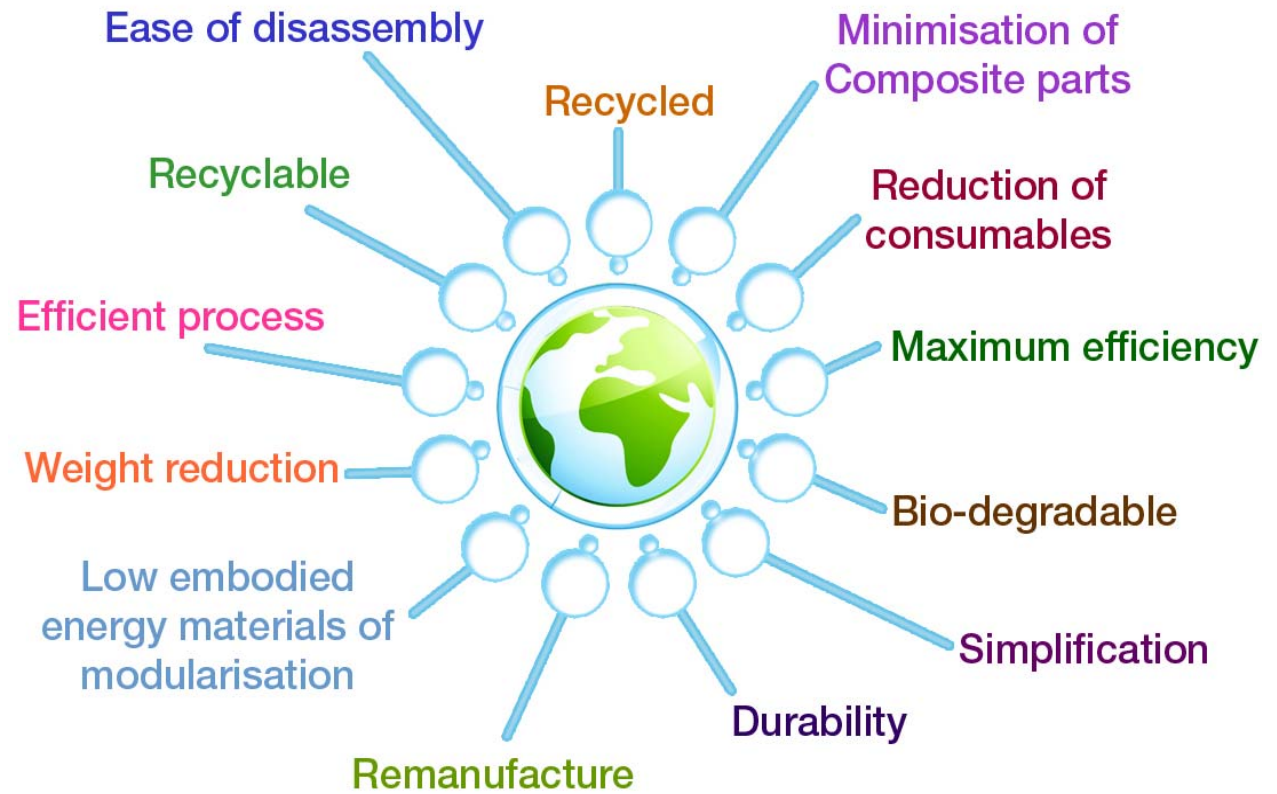


Figure 1.2.W

### 1.3.3 - Principles of green design

While the practical application varies among disciplines, some common principles are as follows:

- Low-impact materials: choose non-toxic, sustainably-produced or recycled materials which require little energy to process
- Energy efficiency: use manufacturing processes and produce products which require less energy
- Quality and durability: longer-lasting and better-functioning products will have to be replaced less frequently, reducing the impacts of producing replacements.
- Design for reuse and recycling: "Products, processes, and systems should be designed for performance in a commercial 'afterlife'.
- Bio-mimicry: "redesigning industrial systems on biological lines ... enabling the constant reuse of materials in continuous closed cycles.
- Service substitution: shifting the mode of consumption from personal ownership of products to provision of services which provide similar functions, e.g., from a private automobile to a car sharing service. Such a system promotes minimal resource use per unit of consumption (e.g., per trip driven).
- Renewability: materials should come from nearby (local or bioregional), sustainably-managed renewable sources that can be composted when their usefulness has been exhausted.



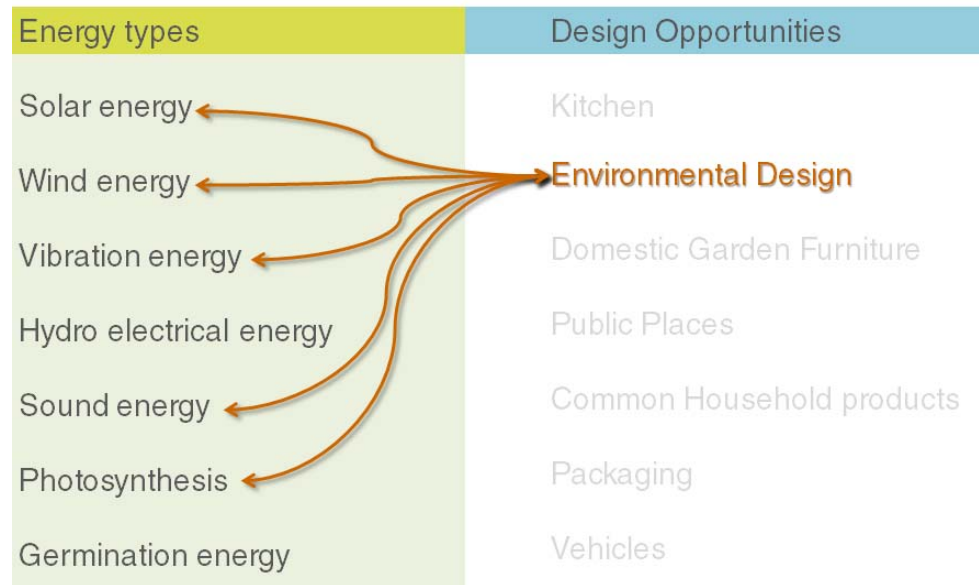
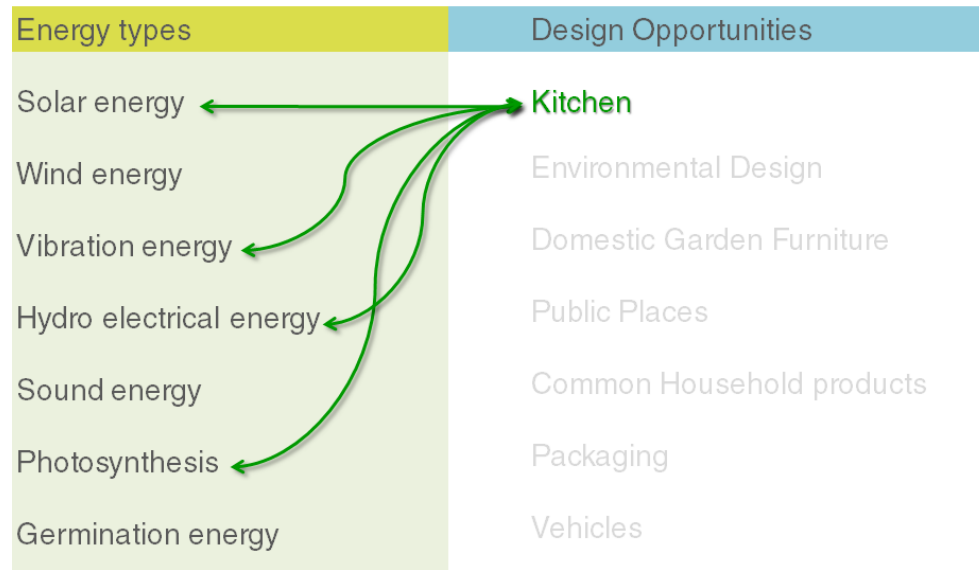
## 1.4 – Mind mapping

### 1.4.1 – Mind mapping

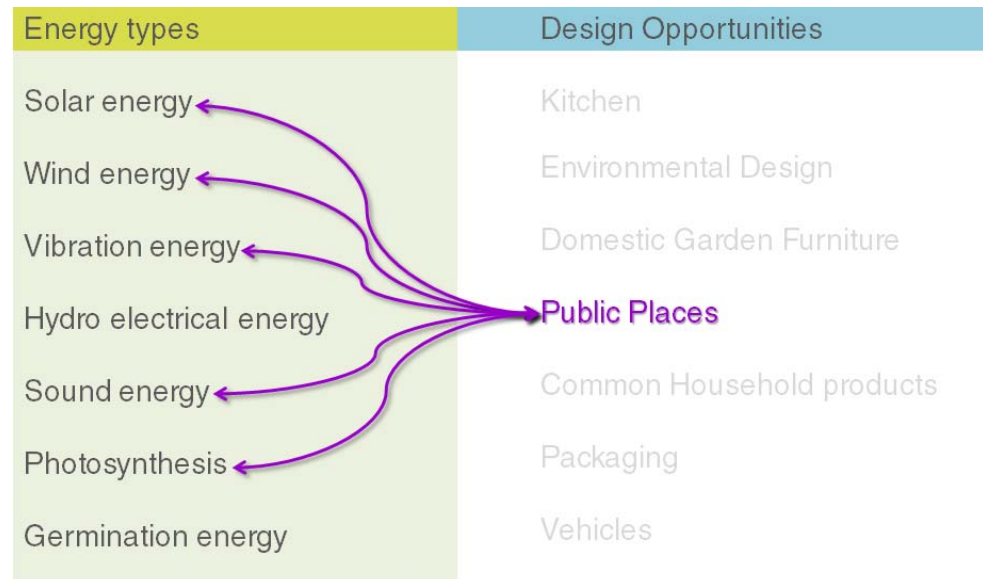
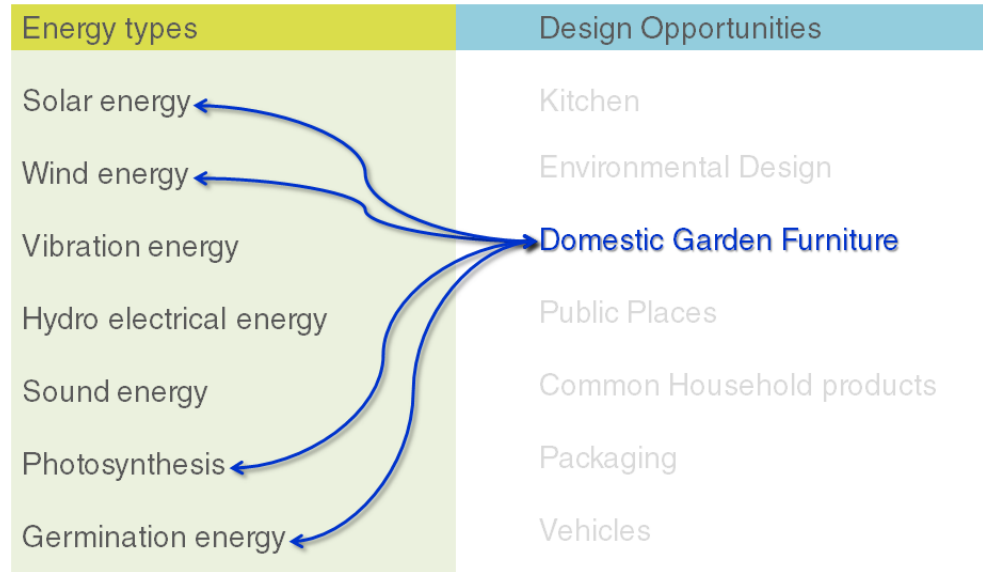
#### Energies and Design Opportunities

Energy types	Design Opportunities
Solar energy	<b>Kitchen</b> appliances using green energy
Wind energy	<b>Environmental Design</b> for road junctions, parks, activity areas etc...
Vibration energy	<b>Domestic Garden Furniture</b>
Hydro electrical energy	<b>Public Places</b> bus stops, waiting sheds
Sound energy	<b>Common Household products</b>
Photosynthesis	<b>Packaging</b> interactive product package with reuse
Germination energy	<b>Vehicles</b>

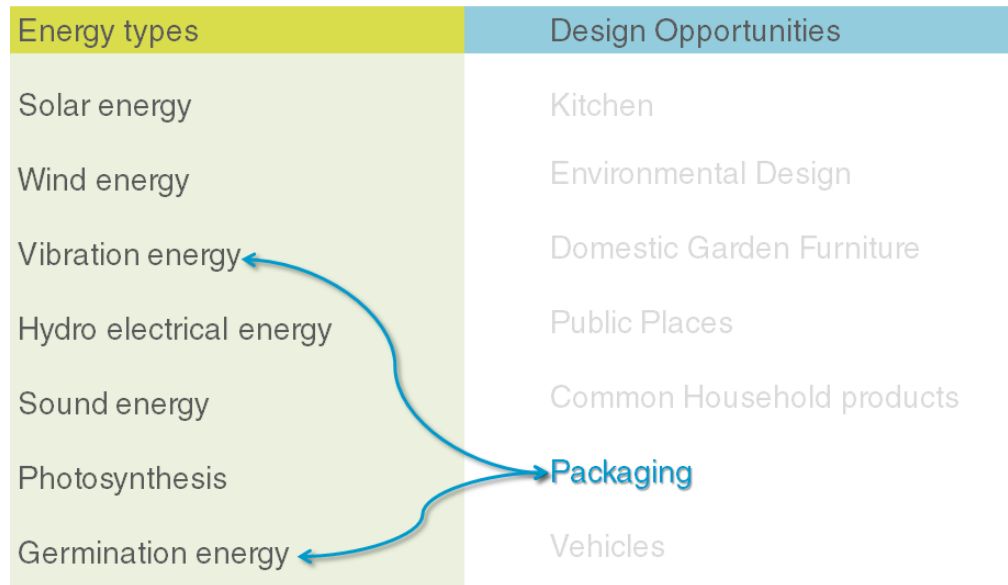
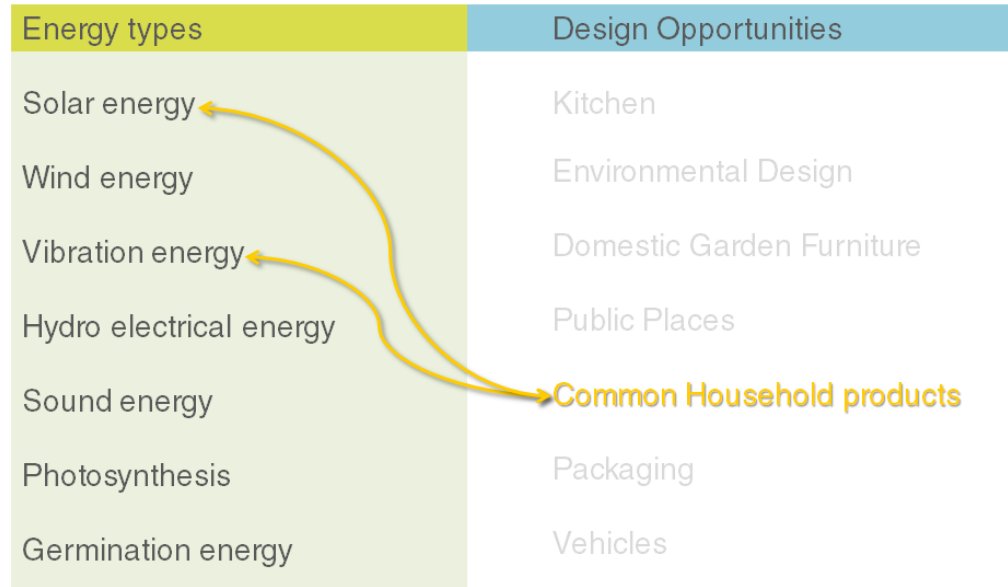
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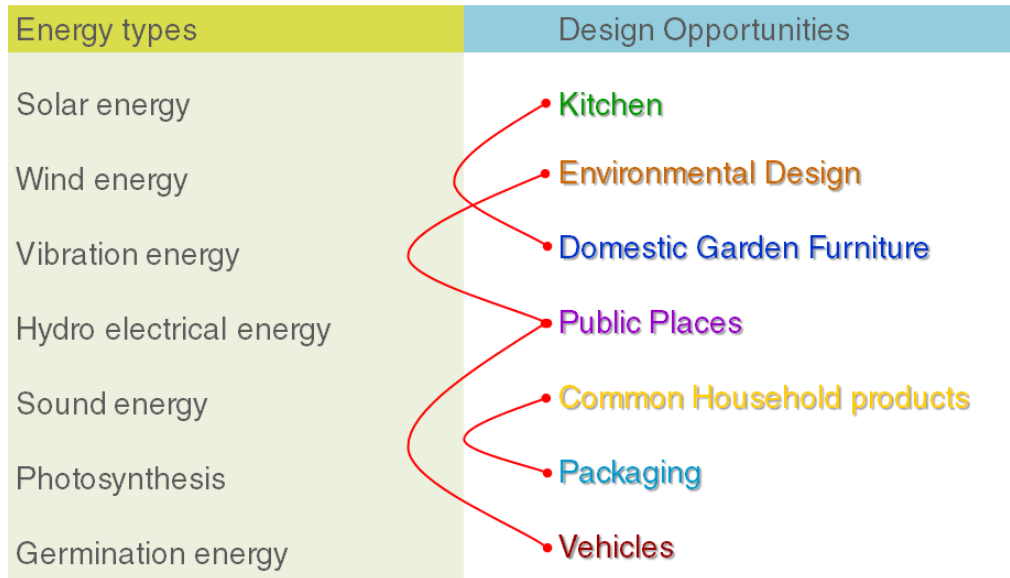
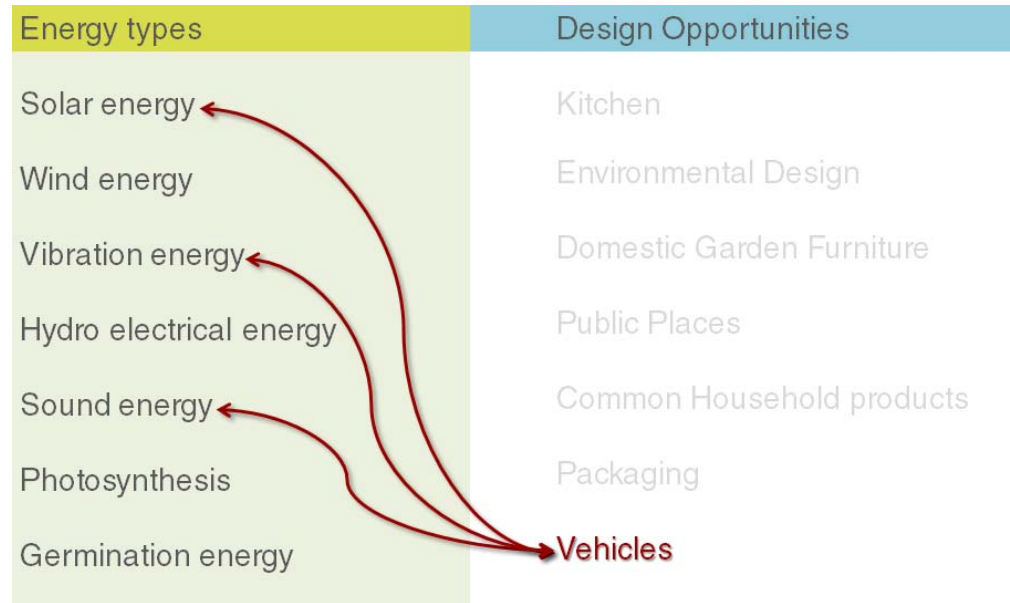


Relations





Relations



## 1.5 – Initial briefing

### 1.5.1 – Initial briefing

Green design is becoming more and more relevant in the present scenario, many developments are happening in the usage of renewable sources of energy for common purposes. The products which can sustain itself by using green energy are the future, human kind is looking at.

Project is dealing with the effective use of green energy in the product which solves one or more Design opportunities provided.

### 1.5.2 – Keywords

Green energy  
Renewable  
Kitchen  
Environmental  
Public places  
Efficiency

## 1.6 – Framework

The thesis is carried out in the following framework.

*Go Green* was the concept through which the thesis is continued its journey through out.

### 1. Research phase

The main aim of this phase was to explore in the area of different types of green energy and techniques in green design projects. The following were the actions carried out at this phase;

- a. Study about the energy sources available.
- b. Study about the green energy, its sources, usage etc...
- c. Mind mapping and brain storming with friends.
- d. Study about the traditional methods of using green energy in different products in the world.
- e. Checking various design opportunities of my project application.

Methods adopted:

- Literature study
  - o Googling
  - o Referring from books and articles
  - o Conversations with friends and professors
  - o Conversation with elder people

Output

- Initial design brief

### 2. Converging phase

Till this phase the area of concentration was very wide and have to narrow down my area of work and to concentrate on one idea or one source

through which the design process is to be developed. The following actions were carried out during this phase;

- a. Traditional methods of cooling water.
- b. Research about water carrying bags.
- c. Principle and physics behind the water cooling technique.
- d. Material study.
- e. Material testing.
- f. Material finalization.

Methods adopted:

- Literature study
  - o Googling
  - o Referring from books and articles
  - o Conversation with elder people
  - o Conversations with professors and friends

Output

- Final design brief

### 3. Design phase

At this point the area of concentration of my project was finalized on water cooling without using any external energy and the main material of concentration is freeze as Canvas which can store water (*Davidi*). The following were the actions carried out in this phase.

- a. Scenario development.
- b. Developing project areas.
- c. Finalizing project areas.
- d. Concept generations.
- e. Concept finalizations.
- f. Design stage
- g. Product name explorations and finalization.

## 2. Research

- 2.1 – Traditional products
- 2.2 – Water cooling
- 2.3 – Water Carriers

## 2.1 – Traditional products

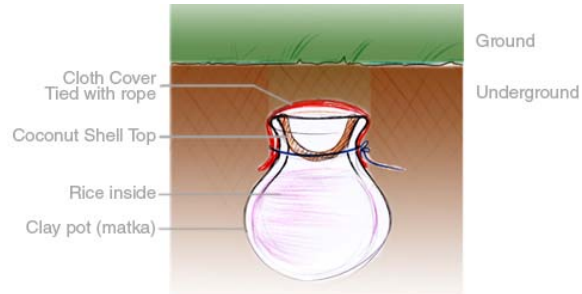
### 2.1.1 – Traditional products

The project was eventually started investigating on energy sources and finally it shifted to researching the traditional products used in India.

Some of the traditional products used in India, without using any external energy are;

#### 1. To store rice in Kerala

In Kerala, 5 decades ago people were used to store excessive cooked rice in a clay pot covered with coconut shell and they used to bury the pot under the ground, so that the rice remains fresh for many days



#### 2. Matka – Clay pots

Clay pots or “Matka” (local language of clay pot) is used all over India and different parts of the world for storing drinking water. The water gets cooled due to the seepage of water from the clay pot.



2.1.A - Matka of clay pots

#### 3. Pyaoo

Pyaoo is a bigger version of Matka which is used to store large quantity of water in the public places and road sides. Pyaoo was made either with clay, animal skin or other different materials.



2.1.B – Pyaoo with clay

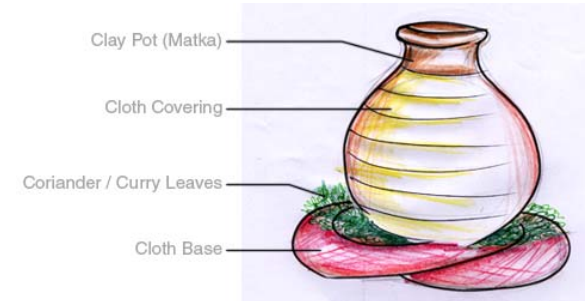
Pyaoo is very old tradition of drinking water for the common man. The main advantage of this product is the water gets cooled without using any external energy.



2.1.C – Olden days Pyaoo

### 3. Clay pot covered with cloth

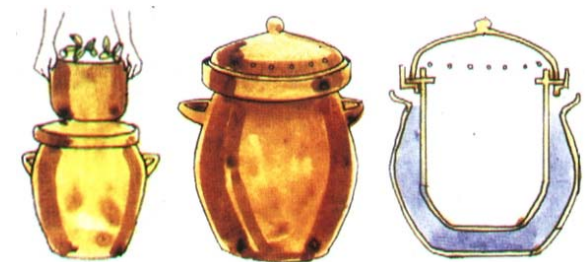
Clay pot covered with cloth and also the pot will be rested on a cloth base, vegetable leaves and coriander leaves be kept under this to store as fresh. Because of the property of Clay pot cool water will keep the surrounding area outside of the pot also cools, which makes the leaves cool and fresh.



Clay pot covered with cloth and leaves kept under

### 4. Sheetal Matka in Rajasthan

This is a traditional way of keeping fruits and vegetables fresh in Rajasthan – India



2.1.D – Sheetal Matka in Rajasthan

There will be two clay pots kept one inside the other. Water will be kept in the outer pot and fruits and vegetables will be stored inside the inner pot. The water stored in the outer pot gets cooled and transfers coolness to the inner pot.

### 5. Vegetable cooling in Africa

Same way, Sheetal Matka is used in African countries to keep the vegetables cool and fresh, the difference is that they will fill the intermediate

gap with sand and then pour water into it, which makes the pots cool and vegetables stored inside fresh.



2.1.E – Vegetable storage in African countries

#### 6. Water bags in Rajasthan (Davidi)

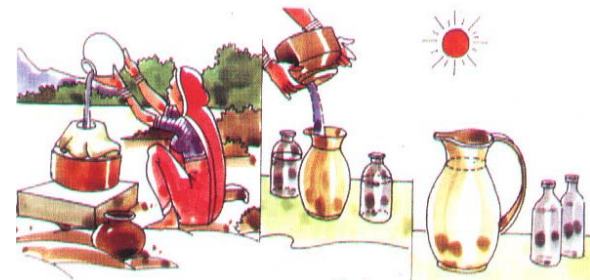
Water bags made of Canvas also known as *Davidi* were used in Rajasthan – India. These bags will keep the water cool and can easily be transported. The people who travel in deserts on camels and lorry driver use these bags.



2.1.F – Davidi

#### 7. Water purifying with sun rays

In olden days water was purified with cloth filters and kept in the jars outside where the sun rays are available.



2.1.F – Water purifying with sunrays

#### 8. Climate control inside the rooms

In Kerala, for controlling the temperature inside the rooms wooden ceiling (*Thattu*) were done, and usually people put mud over these ceiling. The roofs were made using coconut leaves or clay tiles locally called as *Oodu*.

#### 9. Water cooling

For keeping the water cool inside the Matka people used to put local granite stones and use Ramacham and other Medicinal plants roots.

## 2.2 – Water cooling

### 2.2.1 – Principle of water cooling

The method or the principle of cooling water followed is Evaporative cooling.

#### **Evaporative Cooling**

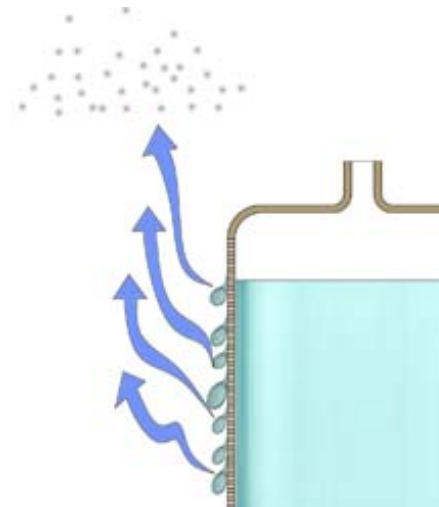
The basic principle relies on cooling by evaporation. When water evaporates it draws energy from the surroundings which produces a considerable cooling effect. Evaporative cooling occurs when air, which is not too humid, passes over a wet surface. The faster the rate of evaporation the greater the cooling will be. The efficiency of an evaporative cooler depends on the humidity of the surrounding air. Very dry air can absorb a lot of moisture so greater cooling occurs. In the extreme case of air, that is totally saturated with water, no evaporation can take place and no cooling occurs.



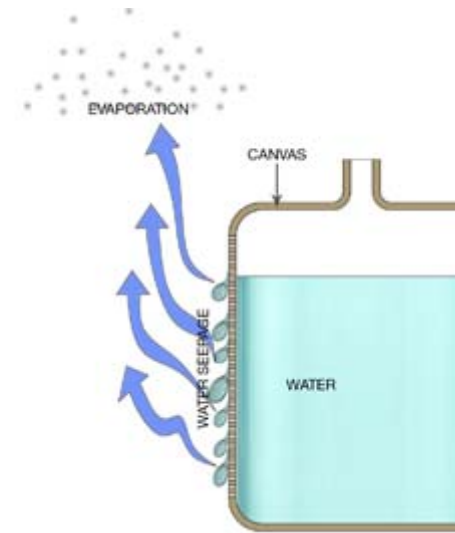
Generally, an evaporative cooler is made of a porous material that is fed with water. When hot dry air is drawn over the material, the water evaporates into the air raising its humidity and at the same time reducing the temperature of the air.

Assuming the earthenware pot absorbs some of the water in it (which it will, if it is not sealed with a glaze or other coating), the outside of the pot will be slightly moistened. As this moisture on the pot evaporates, the temperature of the pot is reduced due to evaporative cooling (same way sweat cools the body). This cooling effect will keep the temperature of the pot lower than it would otherwise be. This effect will only work as long as the outside of the pot is kept moist.

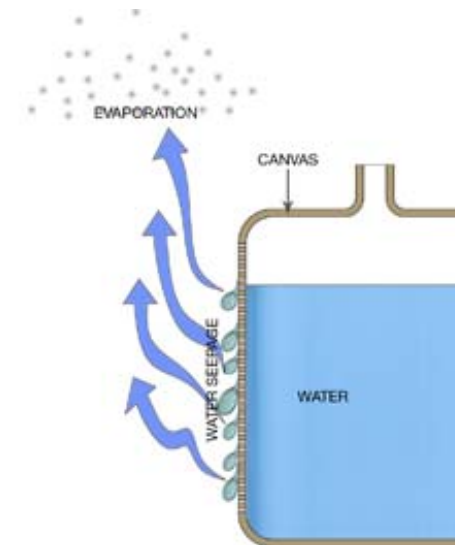
**Stage – 1**  
Water inside the bag



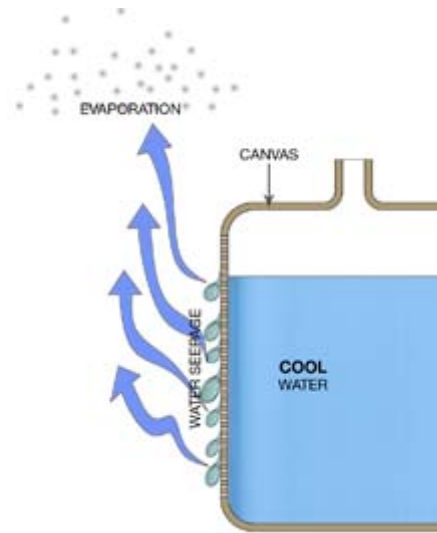
**Stage – 2**



**Stage – 3**

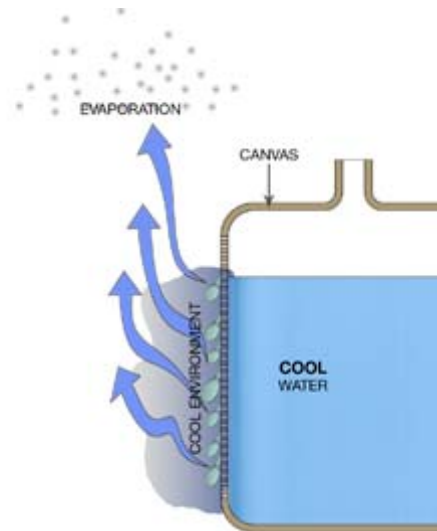


Stage – 4



This is the basic principle of cooling water in Clay pots / Matka or Canvas/ Davidi.

Stage – 5



## 2.3 – Water containers

There are different ways of carrying water, and different types of bags and containers are used all over the world. Some of the natural water containers that can cool water through evaporative cooling are as follows;

Matka or Clay pots



2.2.A – Matka/Clay pot

Gourd bottle



2.2.B – Gourd bottle

Bamboo bags



2.2.C – Bamboo bag

Canvas bags



2.2.D – Canvas bag

Paper water bottle



2.2.F – Paper water bottles



2.2.E – Flax duck Canvas bag

Animal Skin water container



2.2.G – Animal skin water container

Following were some of the water bags which can store water.

**Military water bags**

These water bags are made of Polyester;

Brief Description:  
Military Water Bag \*900D Polyester Oxford, PU coating  
\*PP webbing \*3L Bladder, hydration system \*Molle Bag



2.2.H – Military water bag

**Plastic water bags**

These water bags are made of Plastic;



2.2.I – Plastic water bag

## 3. Material Testing

### 3.1 – Material Testing

### 3.1 – Material Testing

The Canvas were tested with water, and the results obtained were as shown below;

#### 3.1.1 – Day 01

Room temperature - 29°C

Initial water temperature - 23°C

10.30 am	-	23°C
11.00 am	-	21°C
11.45 am	-	20°C
12.45 pm	-	19°C
01.45 pm	-	19°C
02.45 pm	-	19°C

Result: Temperature difference of 4°C in 2 hours and 15 minutes



### 3.1.2 – Day 02

Water taken in this day was hot water.

Room temperature - 26°C

Initial water temperature - 37°C

09.45 am	-	37°C
09.55 am	-	35°C
10.25 am	-	30°C
10.55 am	-	28°C
11.25 am	-	25°C
12.00 noon	-	24°C
12.30 pm	-	23°C
01.15 pm	-	23°C
01.45 pm	-	23°C
02.45 pm	-	22°C

Result: Temperature differences initially were high and later it slows down.





### 3.1.2 – Day 03

The experiment was conducted in the night time.

Room temperature - 23°C

Initial water temperature - 23°C

06.15 pm	-	23°C
07.15 pm	-	23°C
09.45 pm	-	22°C
11.00 pm	-	22°C
12.15 am	-	22°C
09.00 am	-	21°C
10.00 pm	-	21°C

Result: In the night the outside temperature is low, so the water cooling happens very slowly. The water cooling will happen faster only when the outside temperature is high.



## 5. Designing

5.1 – Contexts

5.2 – Dining

5.3 – Kitchen

5.4 – Cost effective

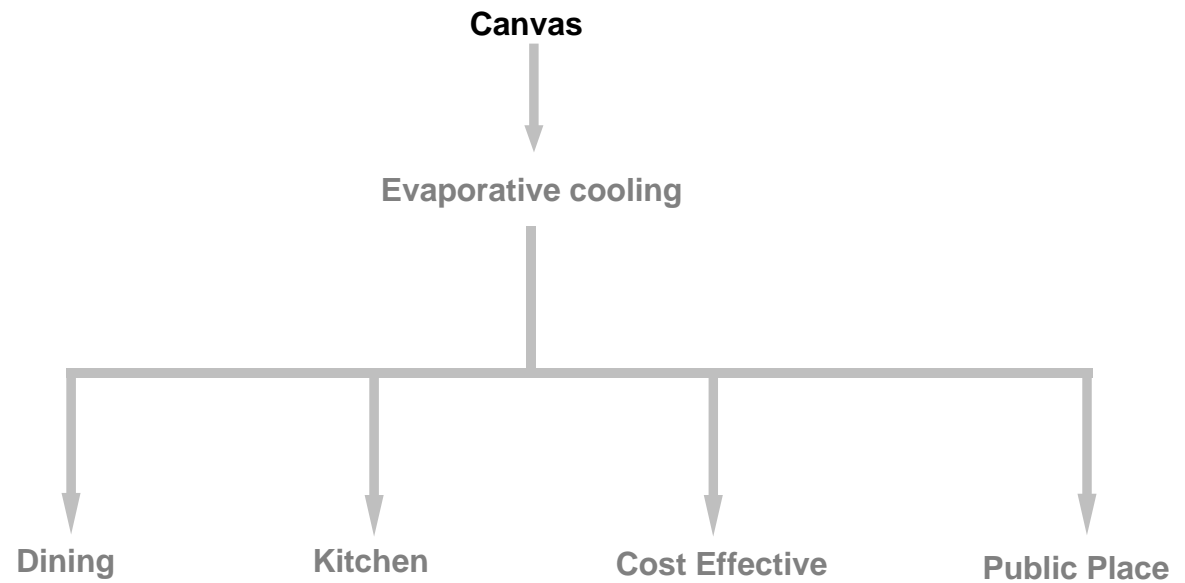
5.5 – Public place (Pyao)

5.6 – Product branding

## 5.1 – Contexts

The idea was to develop different products for different scenarios by using the same material, which is Canvas. The contexts are as follows;

1. Dining
2. Kitchen
3. Cost effective product
4. Public place



## 5.2 - Dining

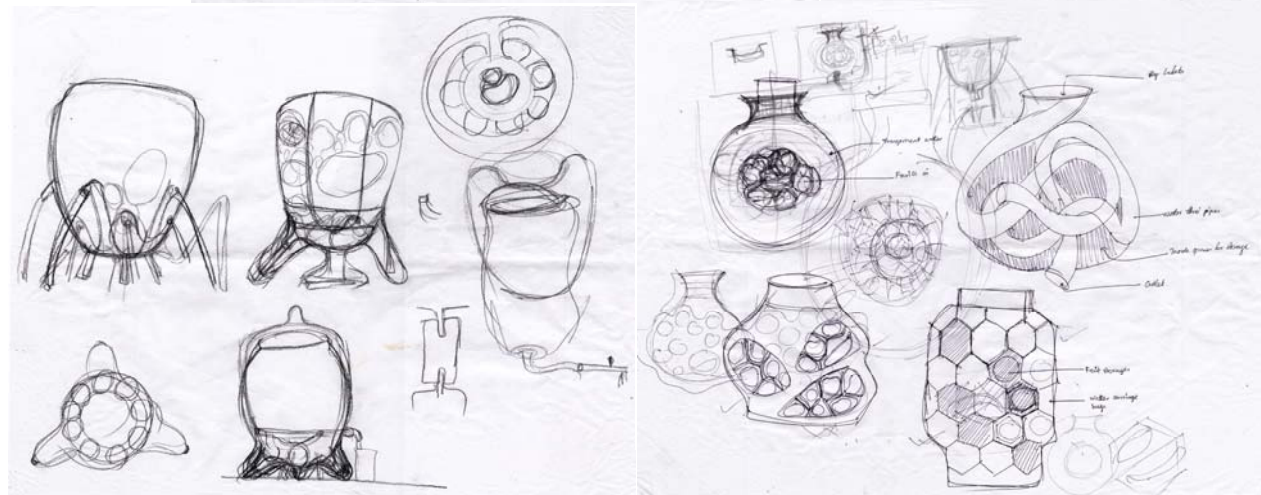
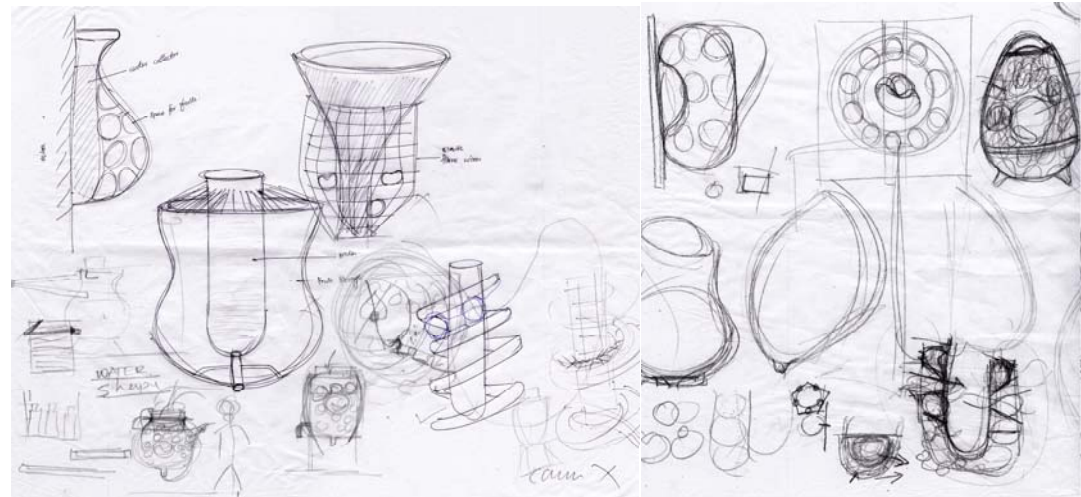
### 5.2.1 - Concept Generations

The main idea behind this product development is to cool water and also store fruits and keep them fresh on the dining table, which will create a different experience for the people.

Some of Initial concepts were as follows;

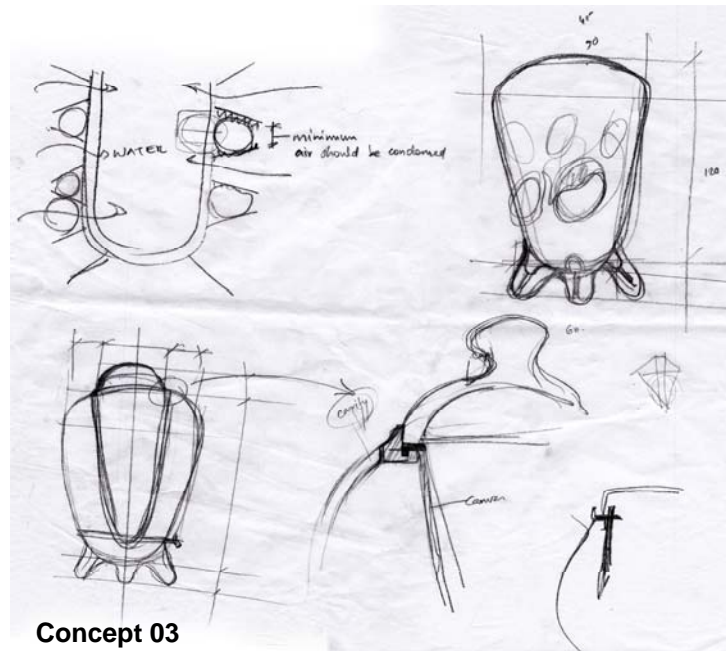


Concept 01



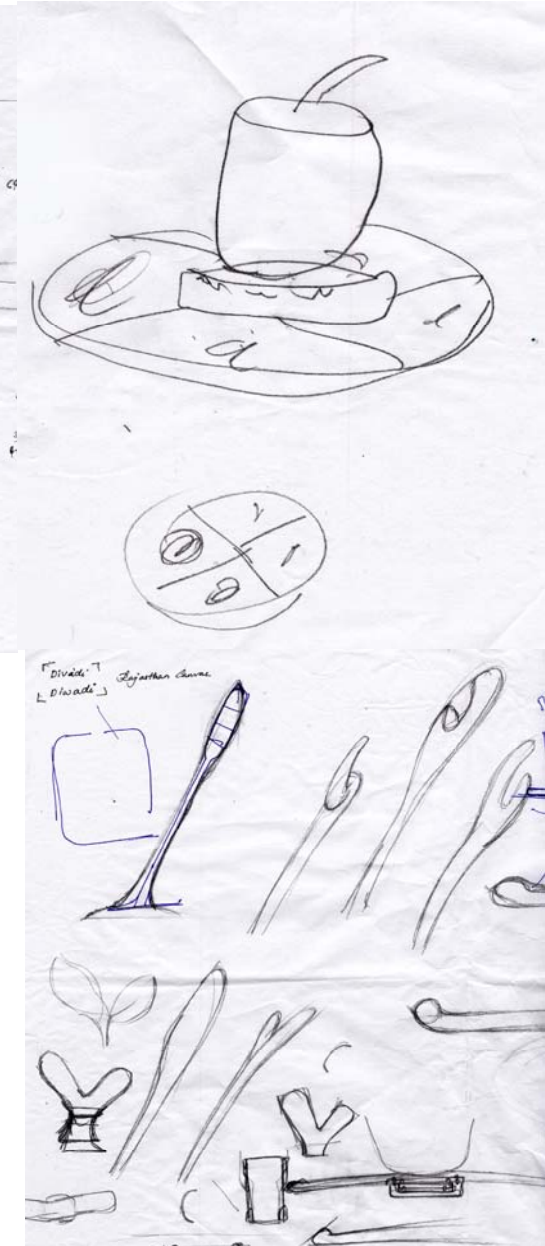
From initial concepts, I converged into detail concepts and different forms were developed according to the way fruits are stored in product. Hence the concepts were more developed by looking at the fact of storing water and fruits. These sketches were developed after the brain storming sessions on the initials concepts prepared.

### Concept 02

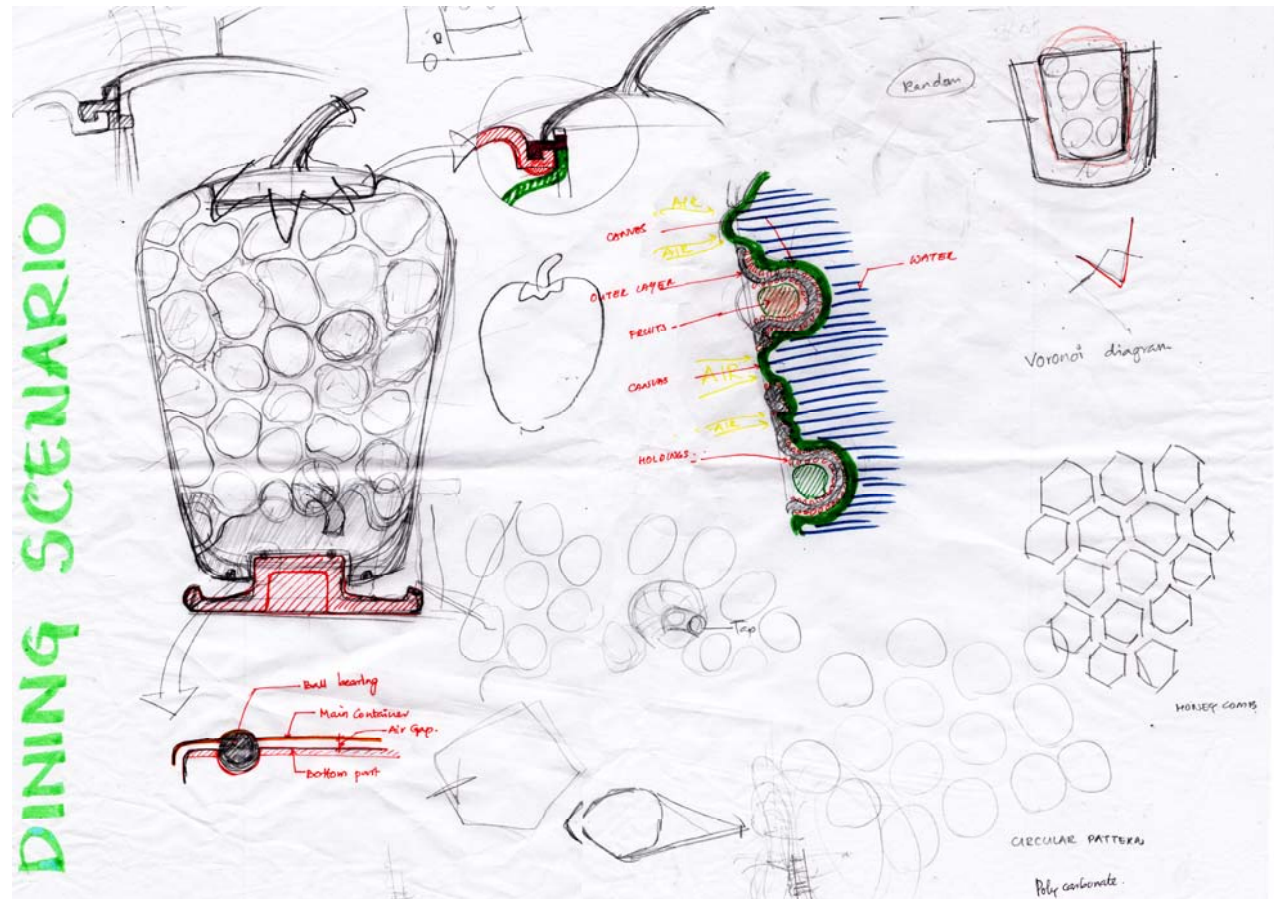


**Concept 03**

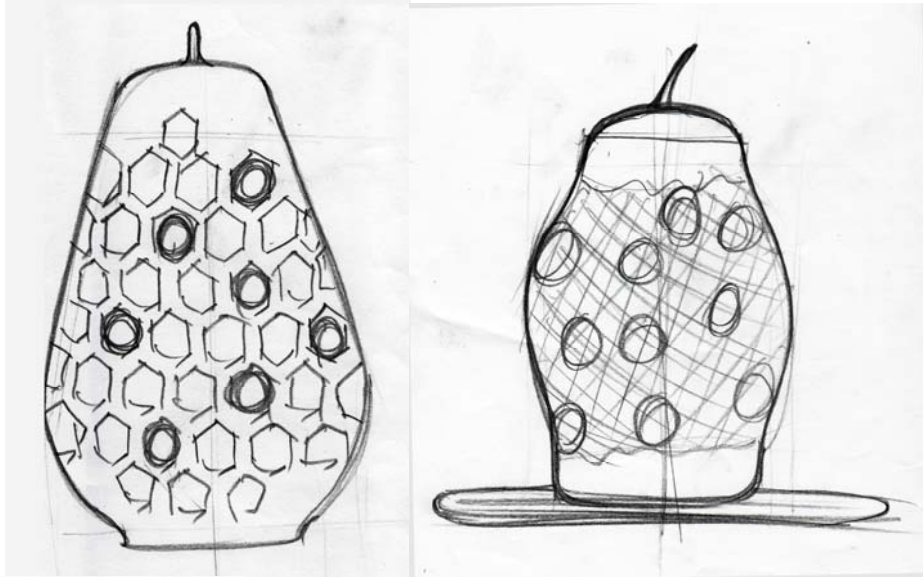
From the Concept 02 stage, more clarity about the product reflected, regarding how the product will be placed on the dining table. So these concepts were looking on different aspects of the product which will create new experience for the people. Concepts were also explored for the handle of the product.



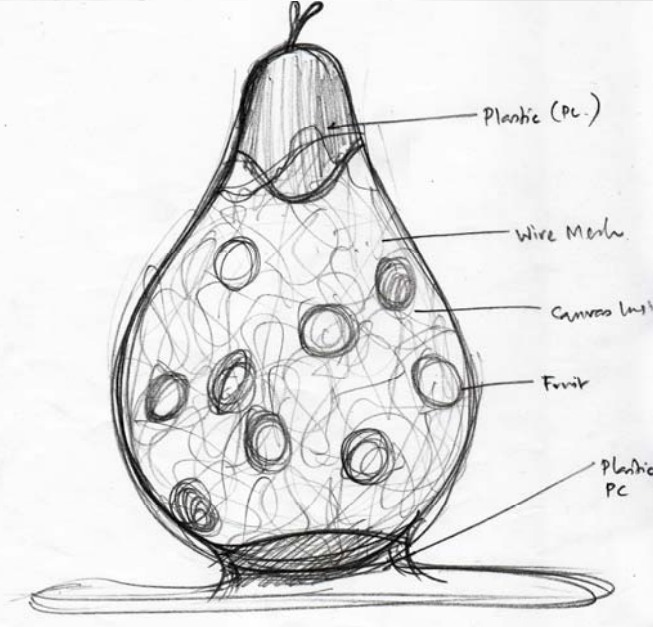
The details of the product were worked out and the fruit storage niche patterns in the product were also explored, from organic patterns to circular patterns, from Voronoi diagram patterns to honey comb patterns.



Concept 04



Concept 04



Some more iterations on the forms were done to make the product more appealing on the dining table.



### 5.2.2 – Design

Design Renderings



Design Renderings



Design Renderings



### 5.2.3 – Scenario

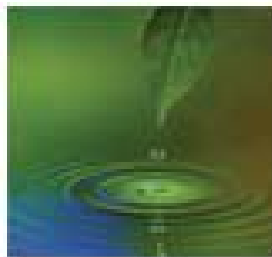
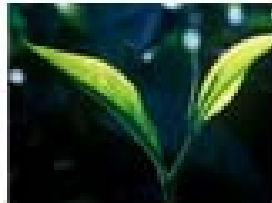
Product in its scenario



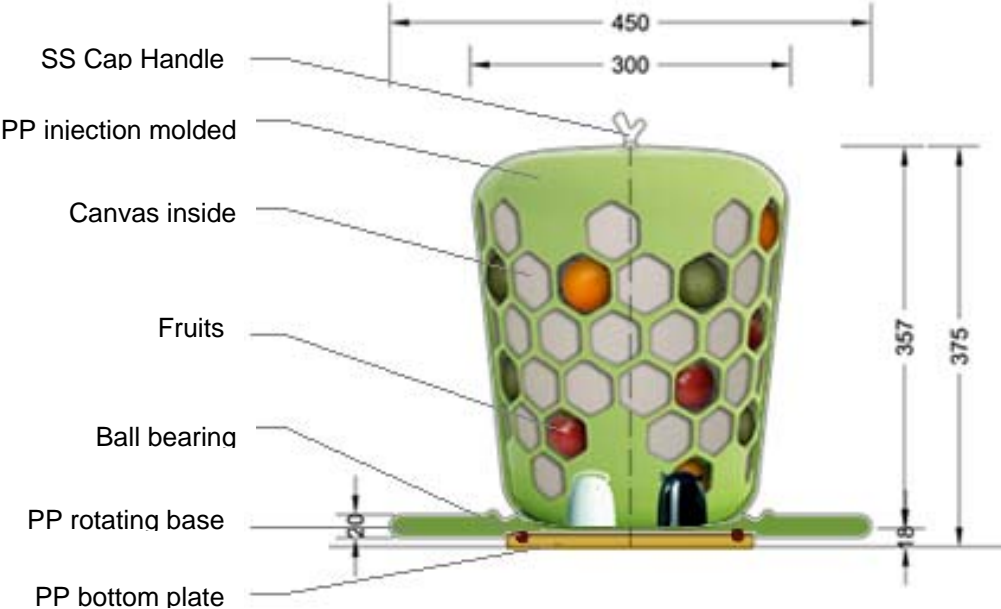


### 5.2.4 – Inspirations

Inspirations of the product



5.2.5 – Details

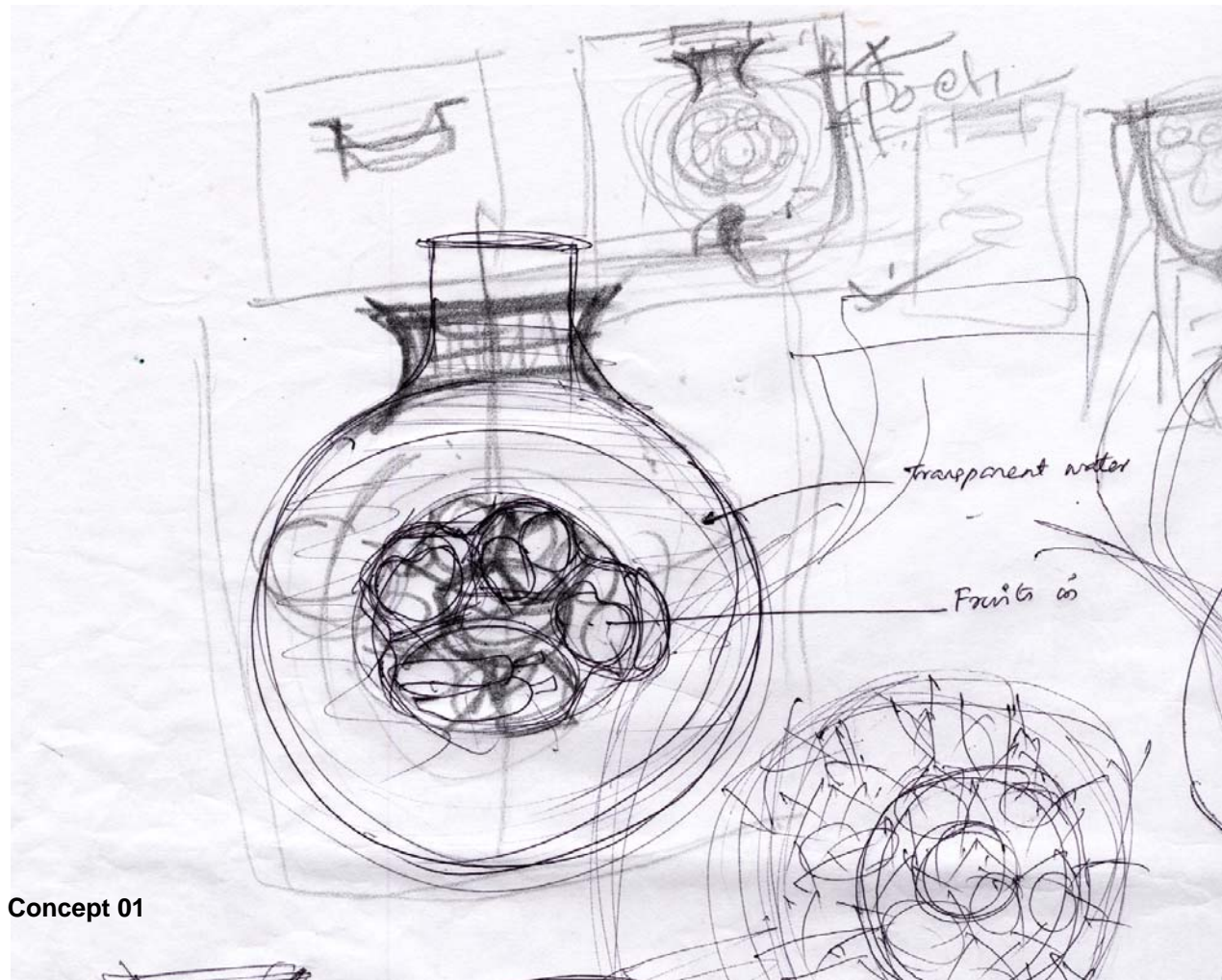


## 5.3 - Kitchen

### 5.3.1 - Concept Generations

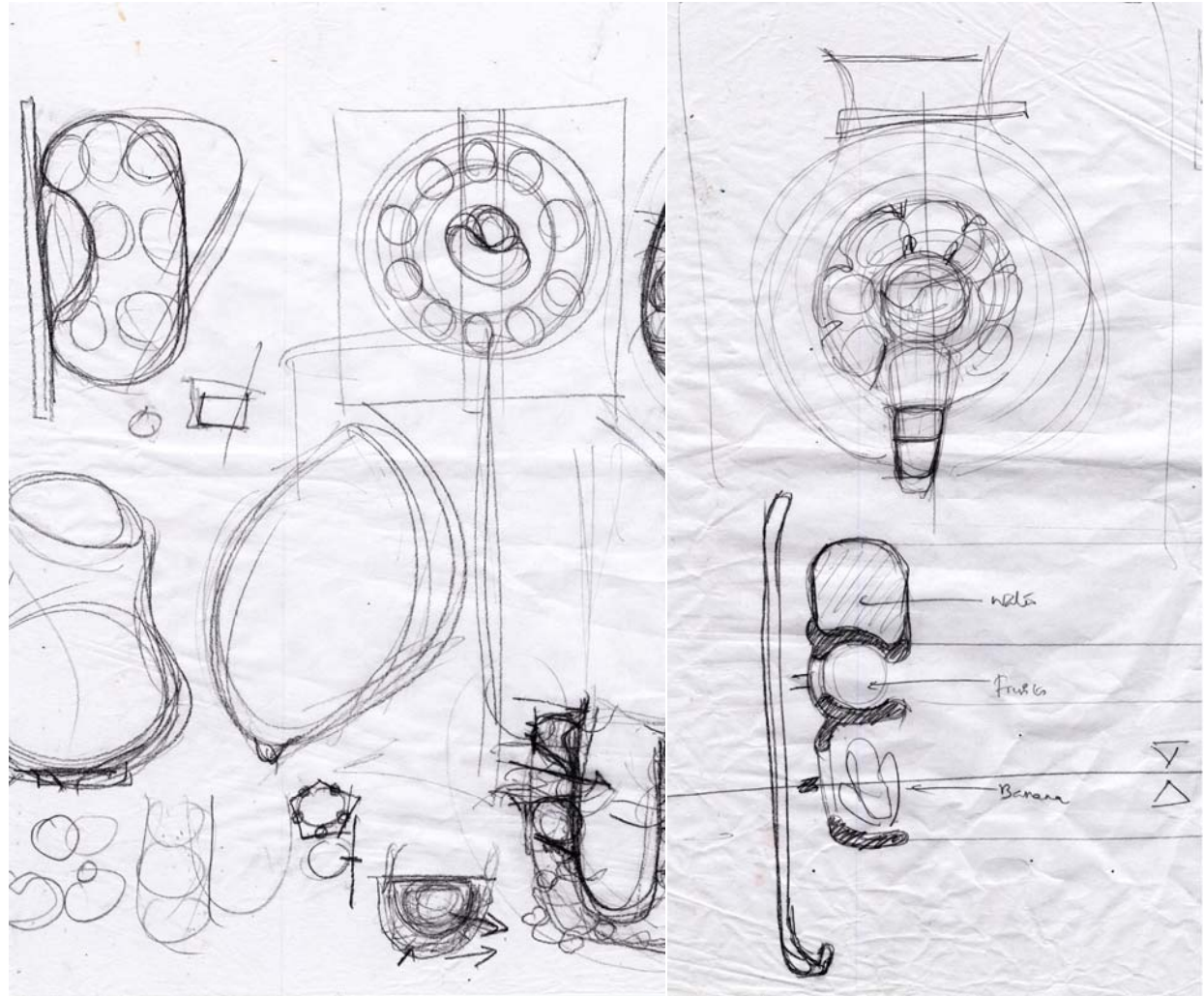
Some of Initial concepts on Kitchen scenario are as follows;

The main idea was to develop a product for the kitchen scenario, where water is an essential part, so the initial idea was to prepare a minimal product with the abstraction of matka in form which can preserve leaves normally used in kitchen for curry preparations.



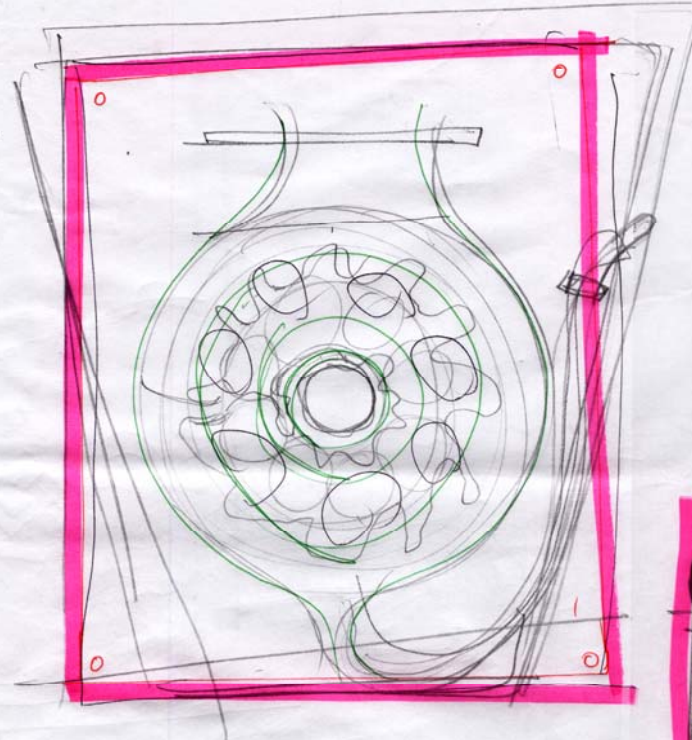


Different ideas were explored to detail the product in a different manner.

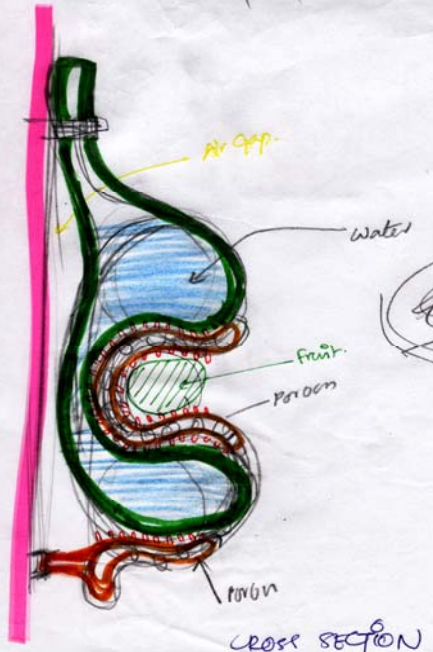
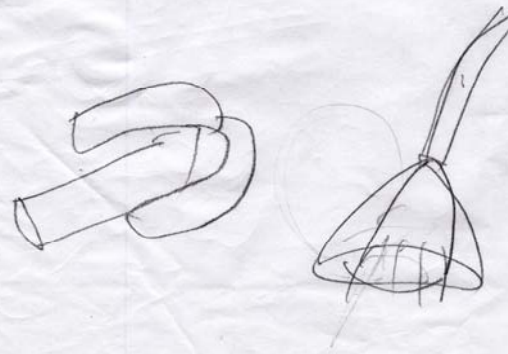


Concept 02

# KITCHEN SCENARIO



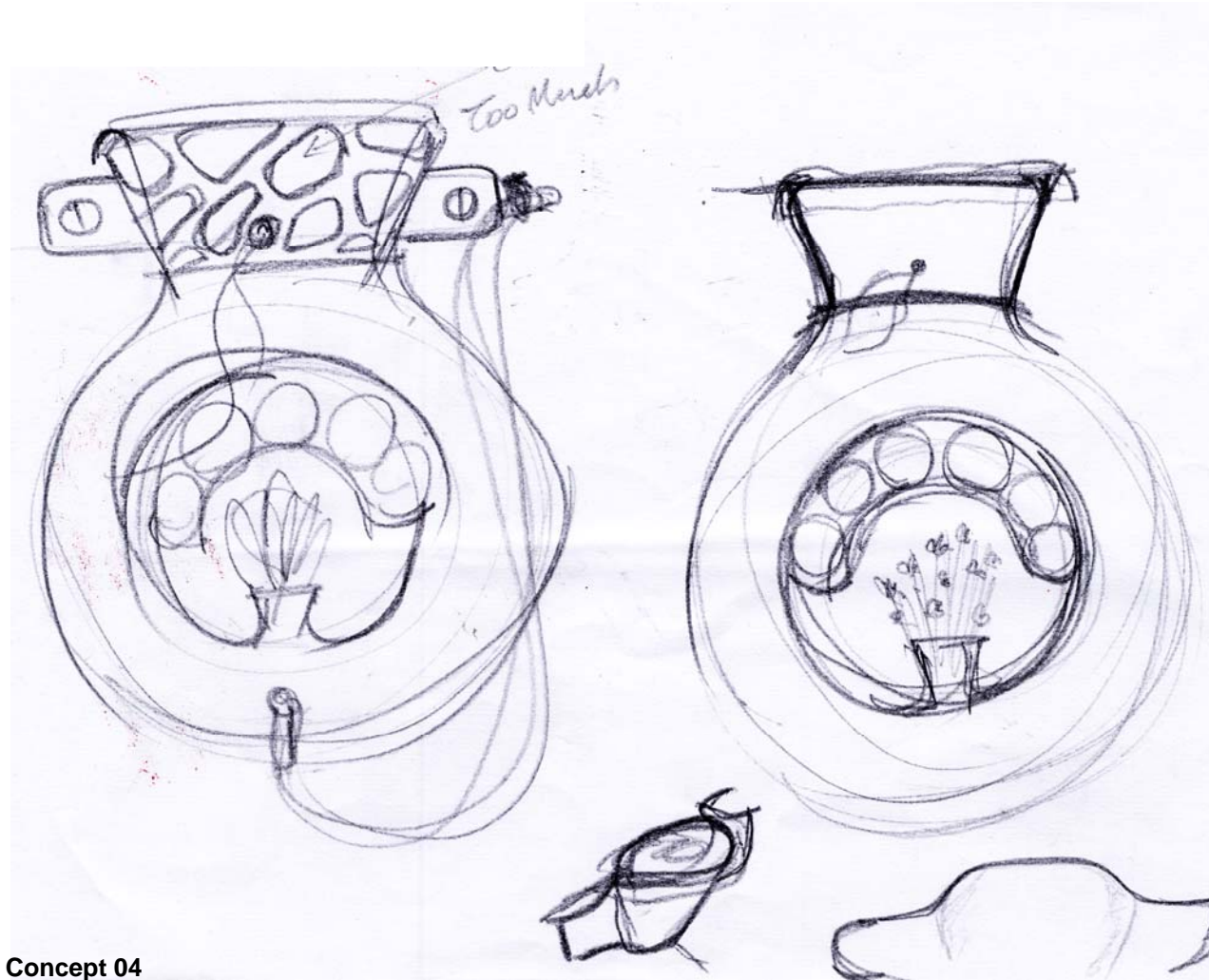
FX 1  
FX 2



The idea of this product was almost clear and details of the product were explored. Canvas is the basic material which will hold the water, and there will be a neck which holds the product to the wall.

Concept 03

The shape and form of the product were frozen after so much of brain storming and discussions. Before finalizing the concept and more iteration were also carried out.



Concept 04

Initial renderings;



Concept 05

**Concept 05**

The fruit storing area is kept simple with only the edges curved to hold the fruits from falling.



**Concept 06**

This concept the fruit storing area is designed differently to incorporate each fruit separately in the place.



### 5.3.2 – Design

Design renderings



Design renderings



Design renderings





### 5.3.3 – Scenario

Product in its scenario



Product in the normal Indian kitchen



Product in modern kitchen.

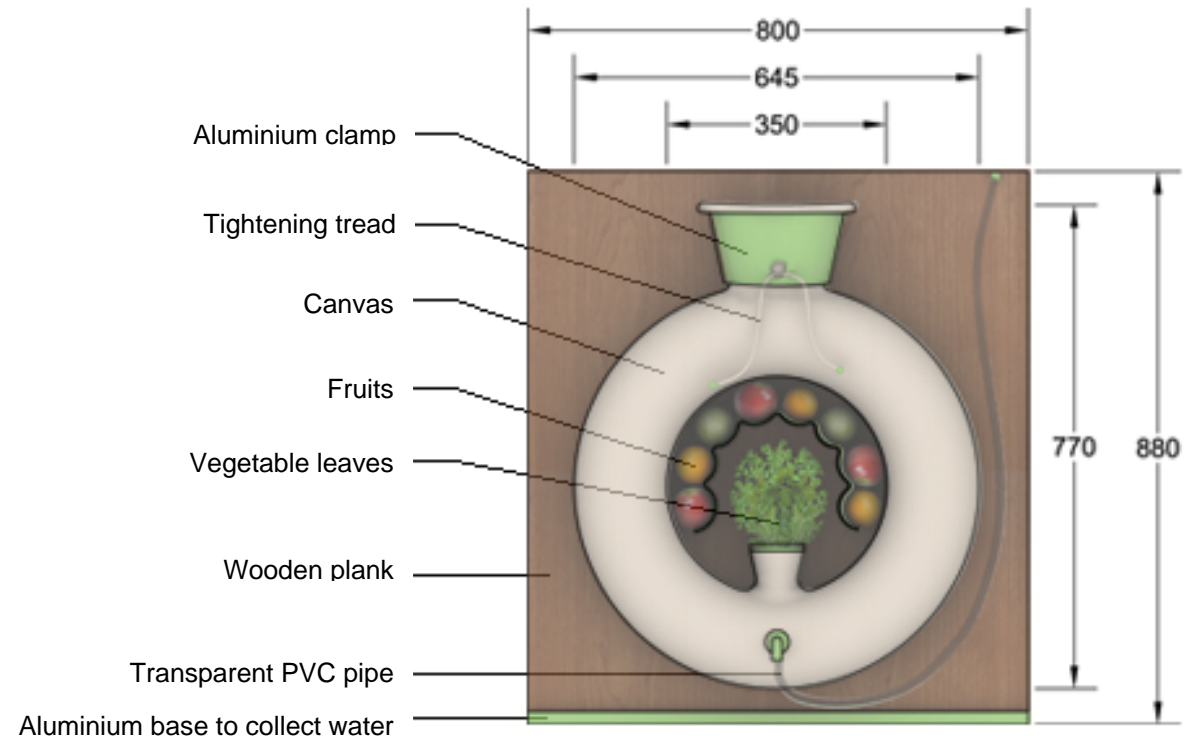


### 5.3.4 – Inspirations

Inspirations of the product



### 5.2.5 – Details

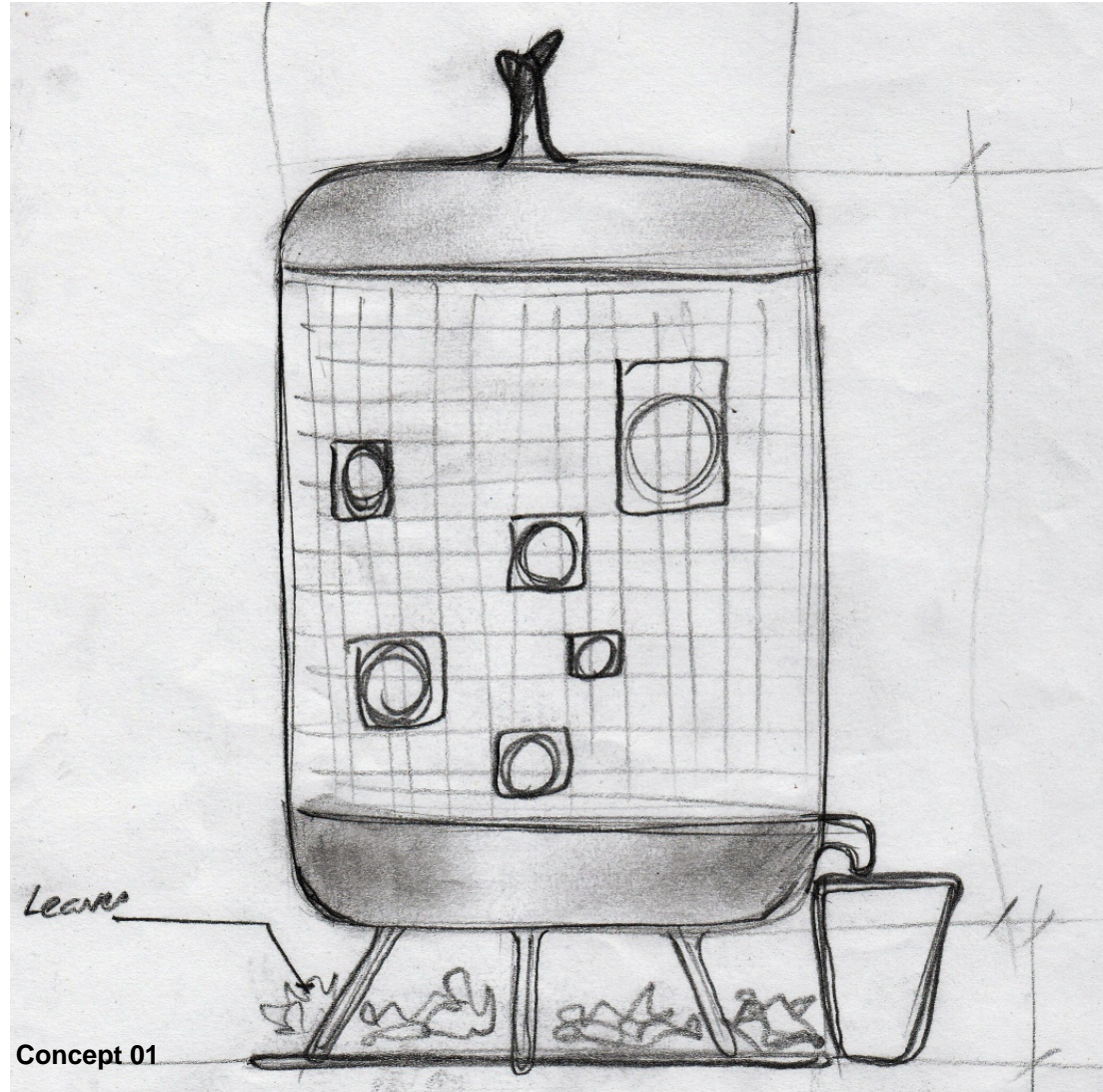


## 5.4 – Cost effective

### 5.4.1 - Concept Generations

Some of Initial concepts on Kitchen scenario are as follows;

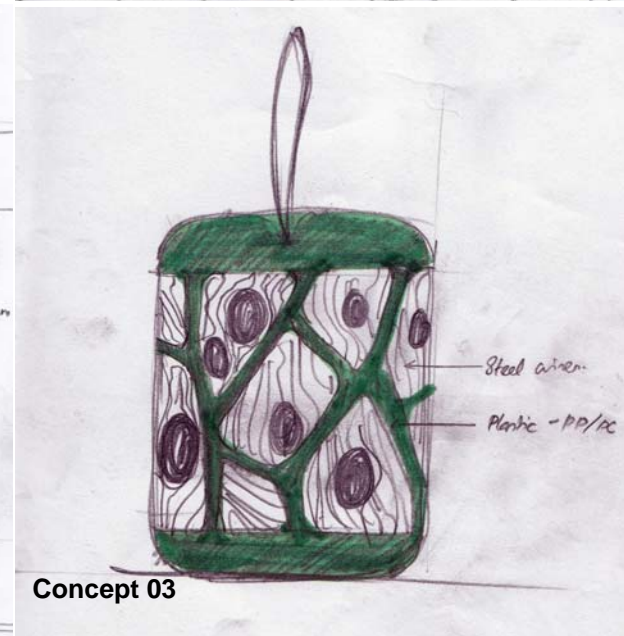
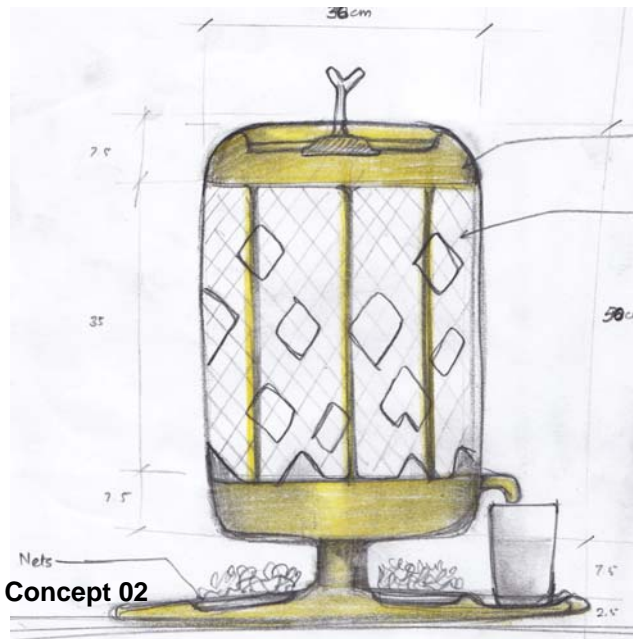
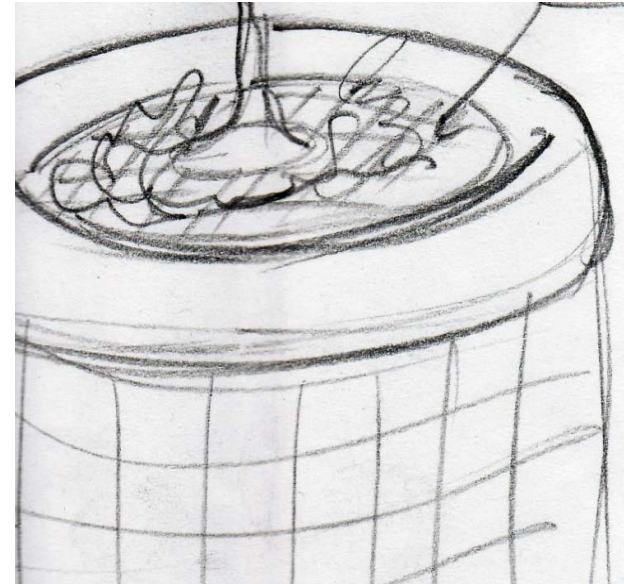
Initially the concept was to develop a natural cooler with bare minimum cost which can be useful for the lower class of people as they are not able to own a refrigerator or a cooler. The product is cost effective; so it is very simple in design, easy to transport and can have the same experience and quality of the other products in this product range, this was the thought behind this product.

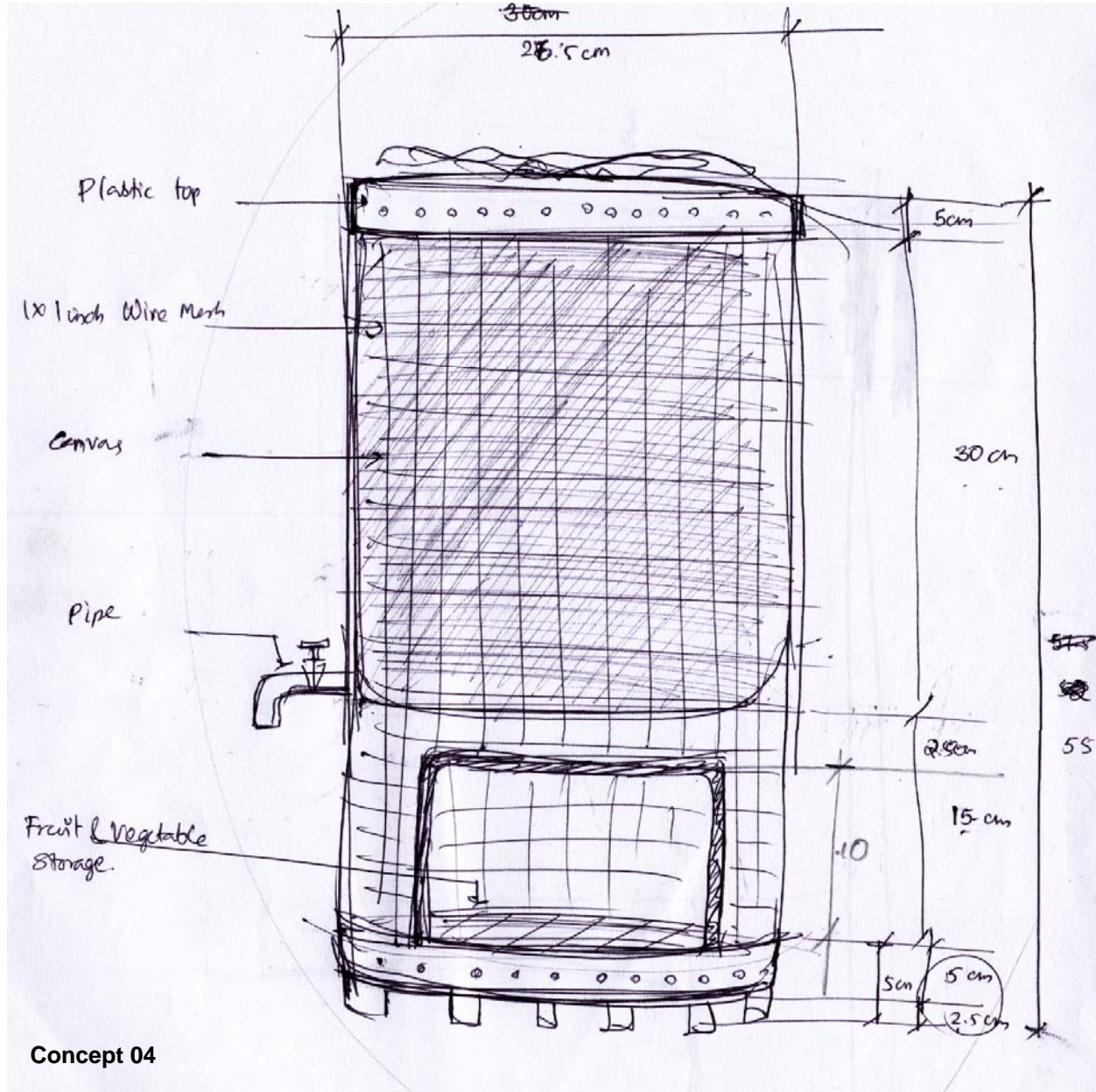


In the Concept 03 the exploration is tried out on the wire mesh and the design is such a way that it will have 4 design elements,

- Top cover plastic (injection molded)
- Middle wire mesh pattern
- Bottom plastic (injection molded)
- Base where the leaves and vegetables can kept.

In the next Concept 03 some more aesthetic were tried out with the same design elements, and instead of wire mesh steel wires were explored.

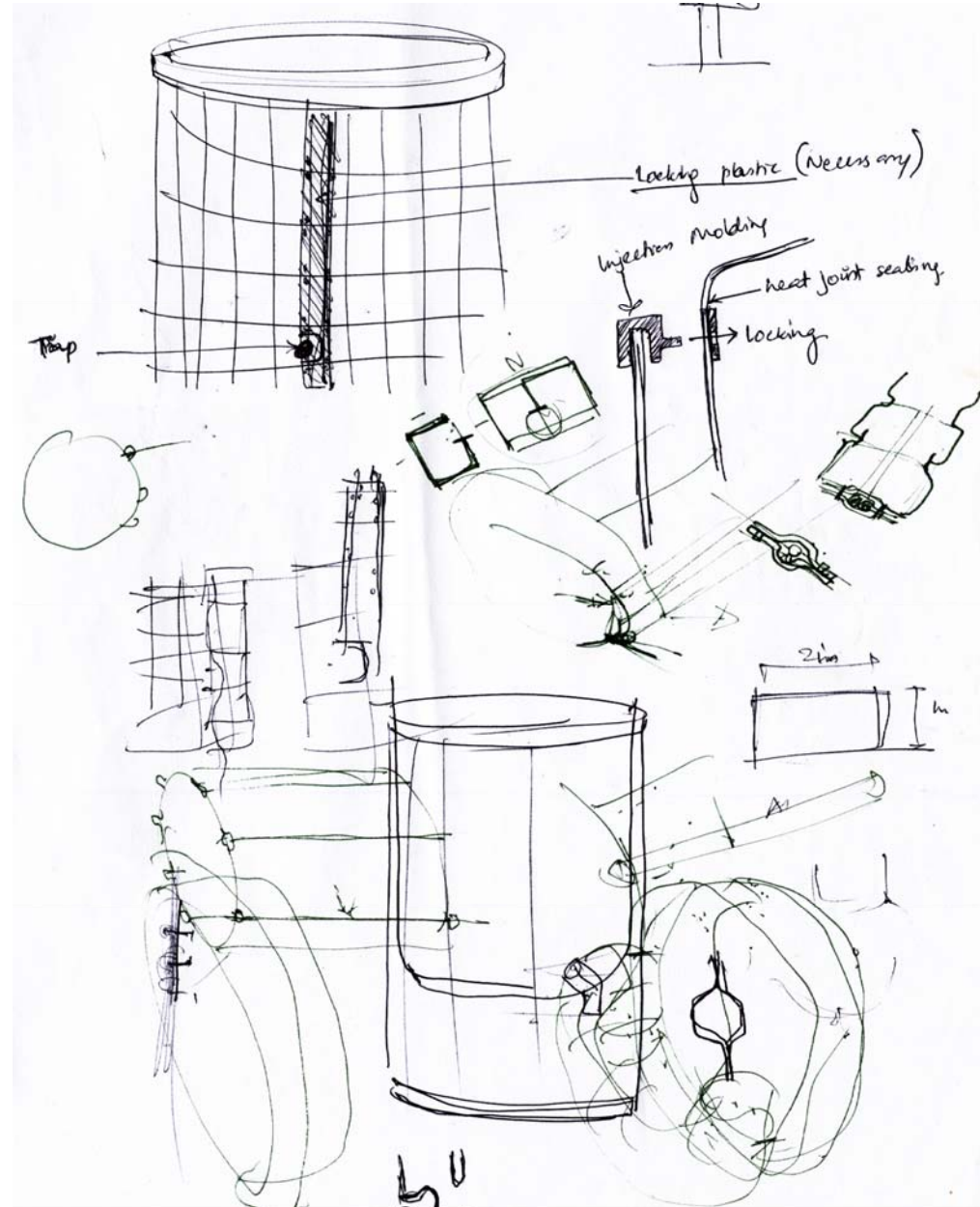




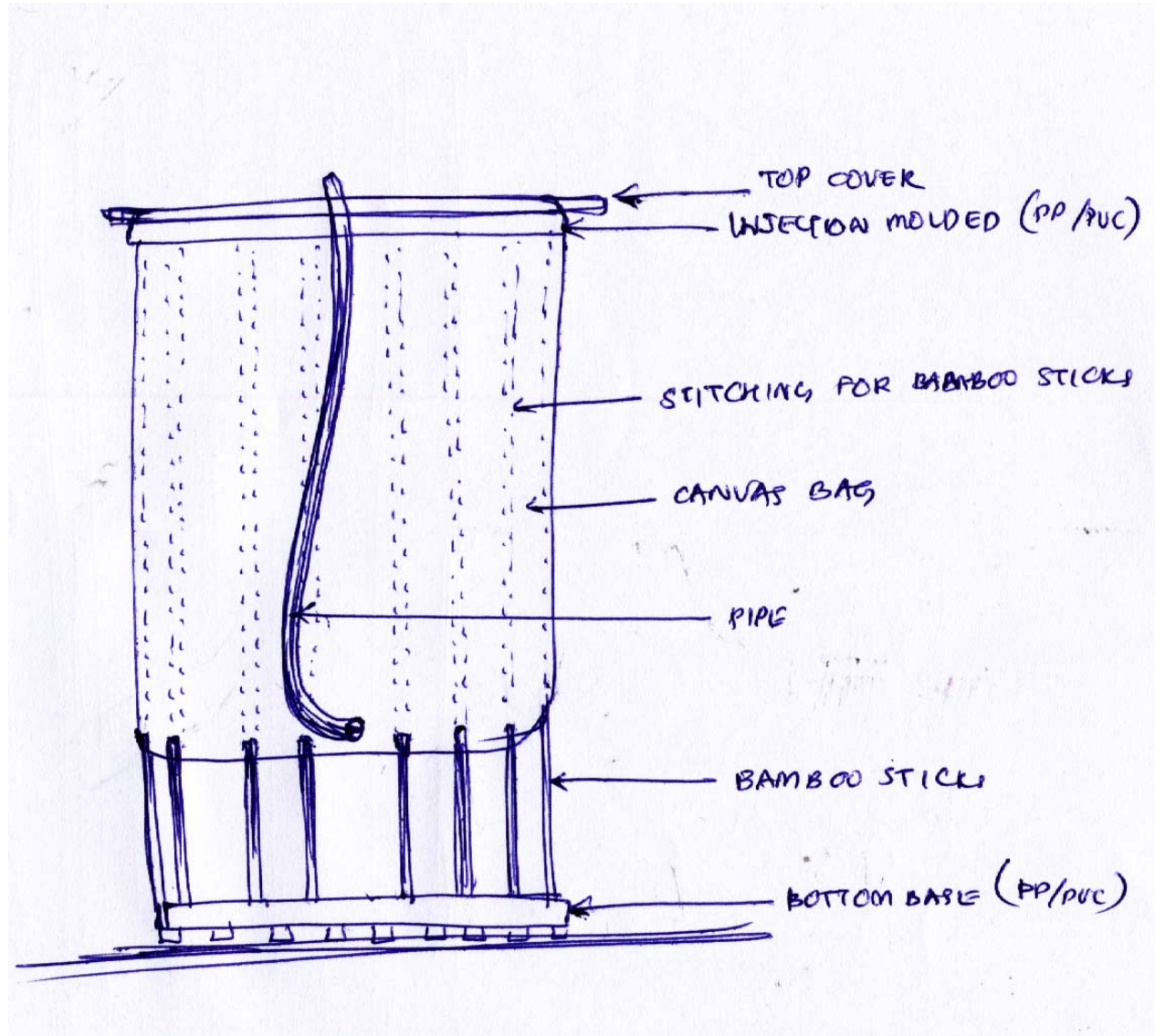
**Concept 04**

From the concept above, concept 04 is developed thinking to reduce the amount of plastic material in the product. You can see in the sketch only top and bottom holders are made of injection molded PP/PVC. Here the whole body is standing on the wire mesh, and a extrude cut is created to put the leaves and vegetables inside. A tap also provided for dispensing water.

These sketches shows the details tried out for the above Concept 04. The details of plastic and wire mesh joining, ends of the wire mesh joint were explored. More explorations were carried out with the actual material which is provided in the prototyping chapters as explorations.

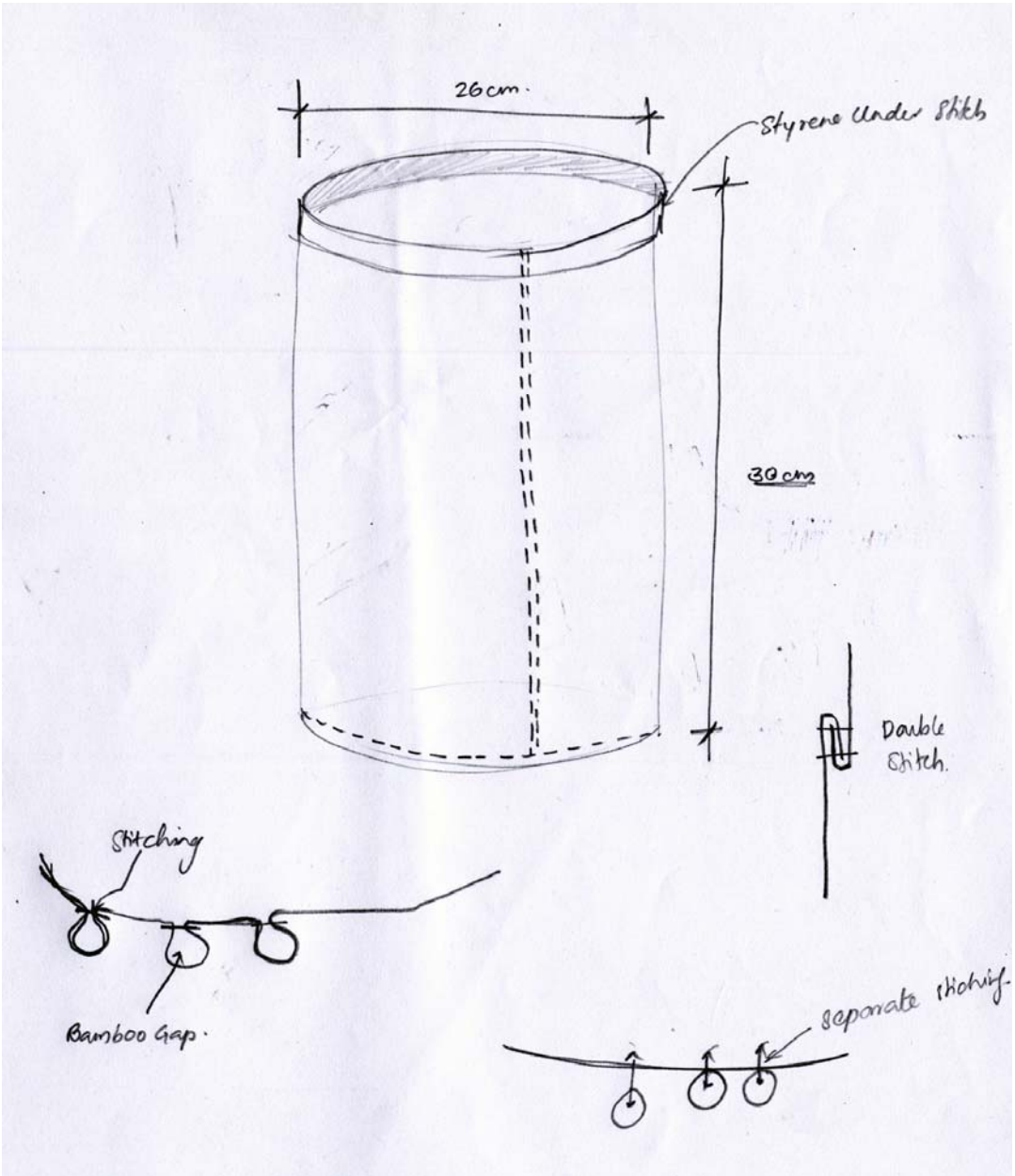






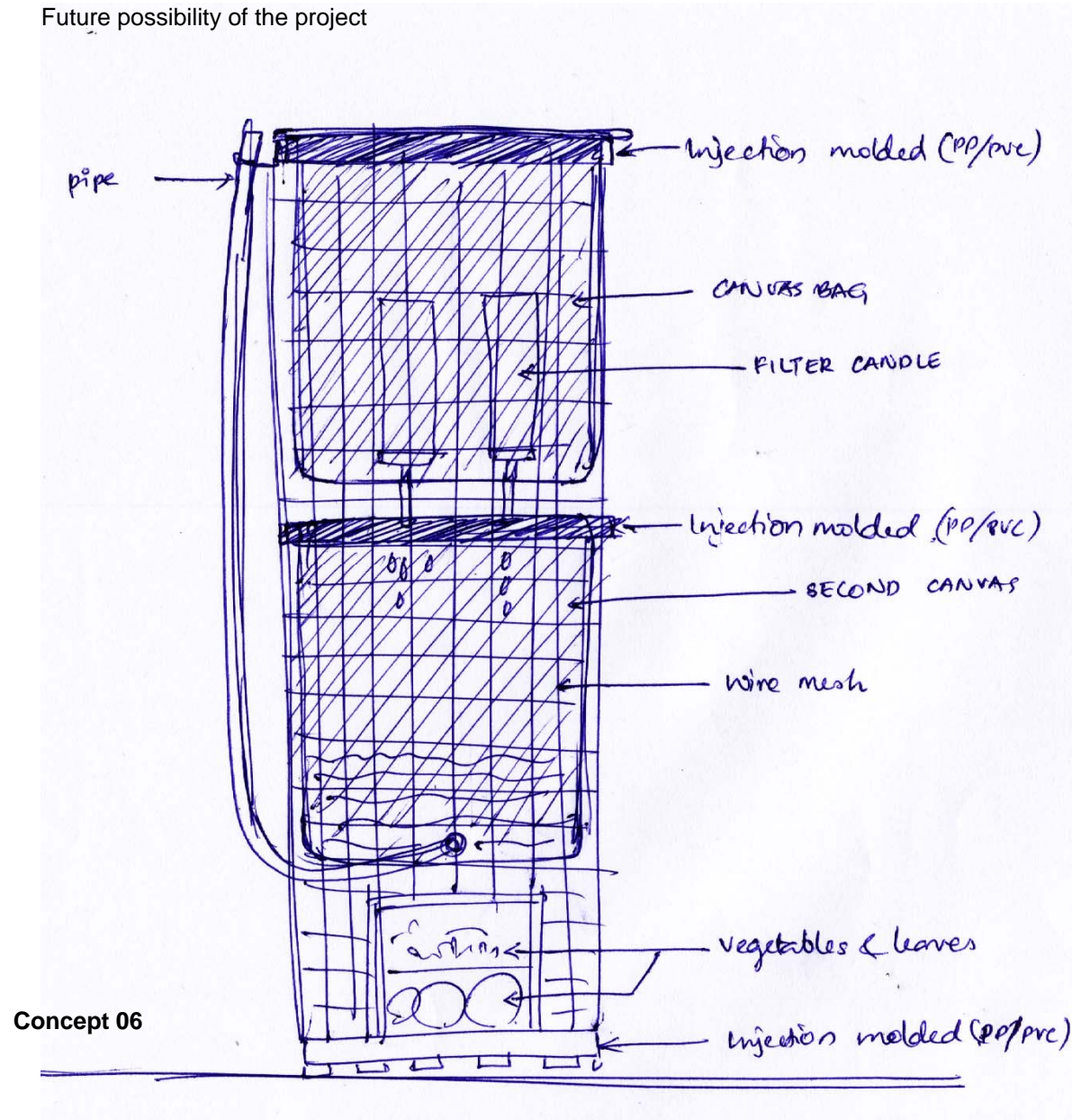
After tremendous discussions and brain storming, the design has come to a concluding level to replace the wire mesh with bamboo sticks, which is cheaper and have the strength to hold the product in its vertical position. The tap is replaced with a pipe which is maintenance free and cost effective and easy to use. The bamboo sticks will place in the grooves made in the canvas bag by stitching, so the movement of the sticks is restricted.

**Concept 05**



The details were worked out for the Concept 05. Details of stitching were also worked out including the dimensions of the canvas.

Future possibility of the project



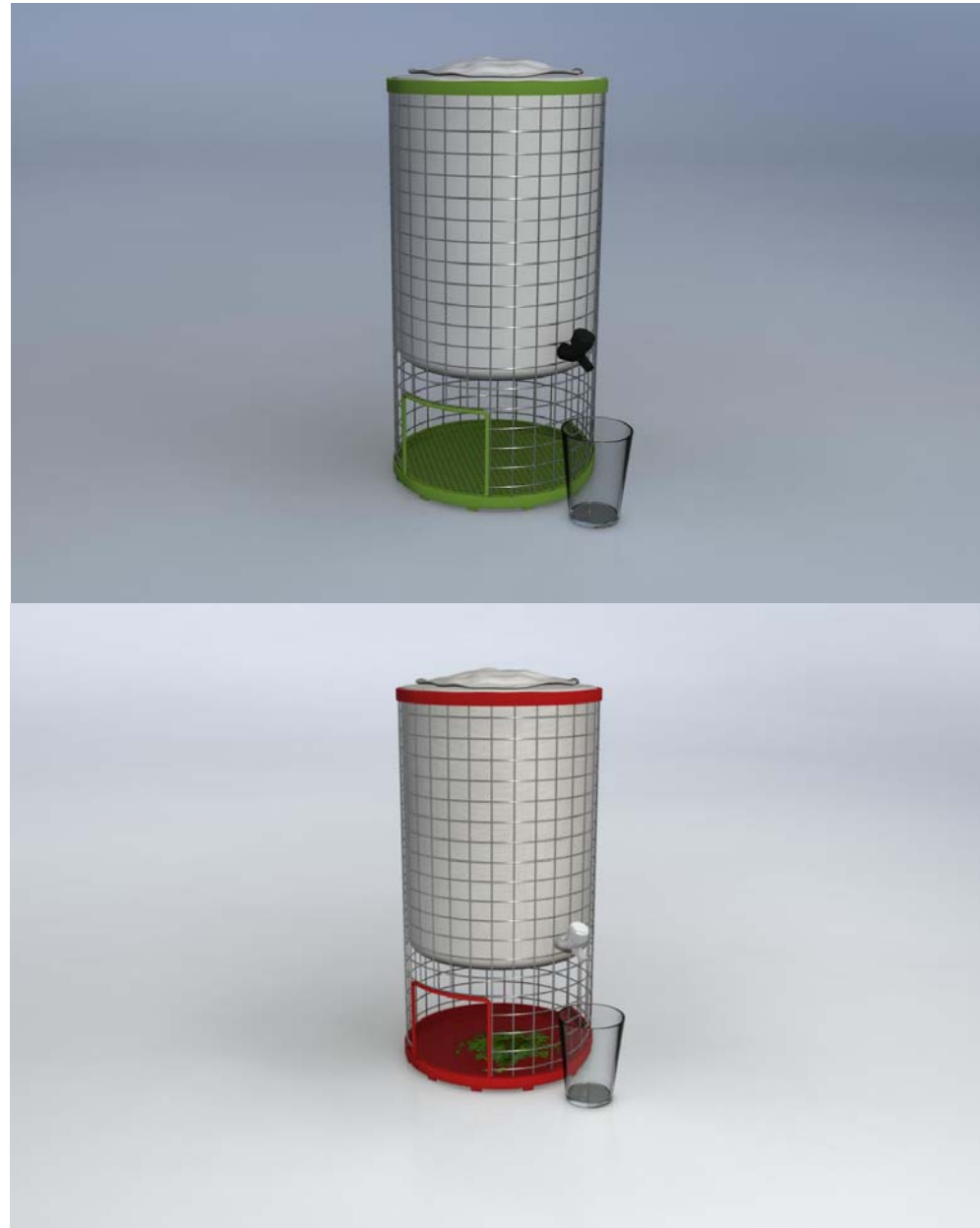
The concept is developed as an extension of Concept 04 where the addition of water filter candles, which are readily available in the market for cheap rates, and people will get a hygienic and filtered cool drinking water for very less cost.

Initial renderings;



These are the renderings developed for the Concept 01 where the top cover and bottom cover are made of injection molded plastic and the wire mesh is kept in the middle.

These are the renderings done for the Concept 04, where the tap provided for the water and the wire mesh is provided to hold the canvas.



Renderings of Concept 04 and Concept 05. In Concept 04 the proportion is reworked, and thus product looks much cleaner and aesthetically good from the above rendering.



Explorations with spacing between the bamboo sticks;



Finalized bamboo sticks position, the top is replaced by the pipe and the bamboo sticks are placed in such a way that the users can easily put the vegetables and leaves inside. The stitch on the side will hold the canvas tight taking the load of water. Thus adds to the aesthetics of the product.





#### 5.4.2 – Design





### 5.4.3 – Scenario

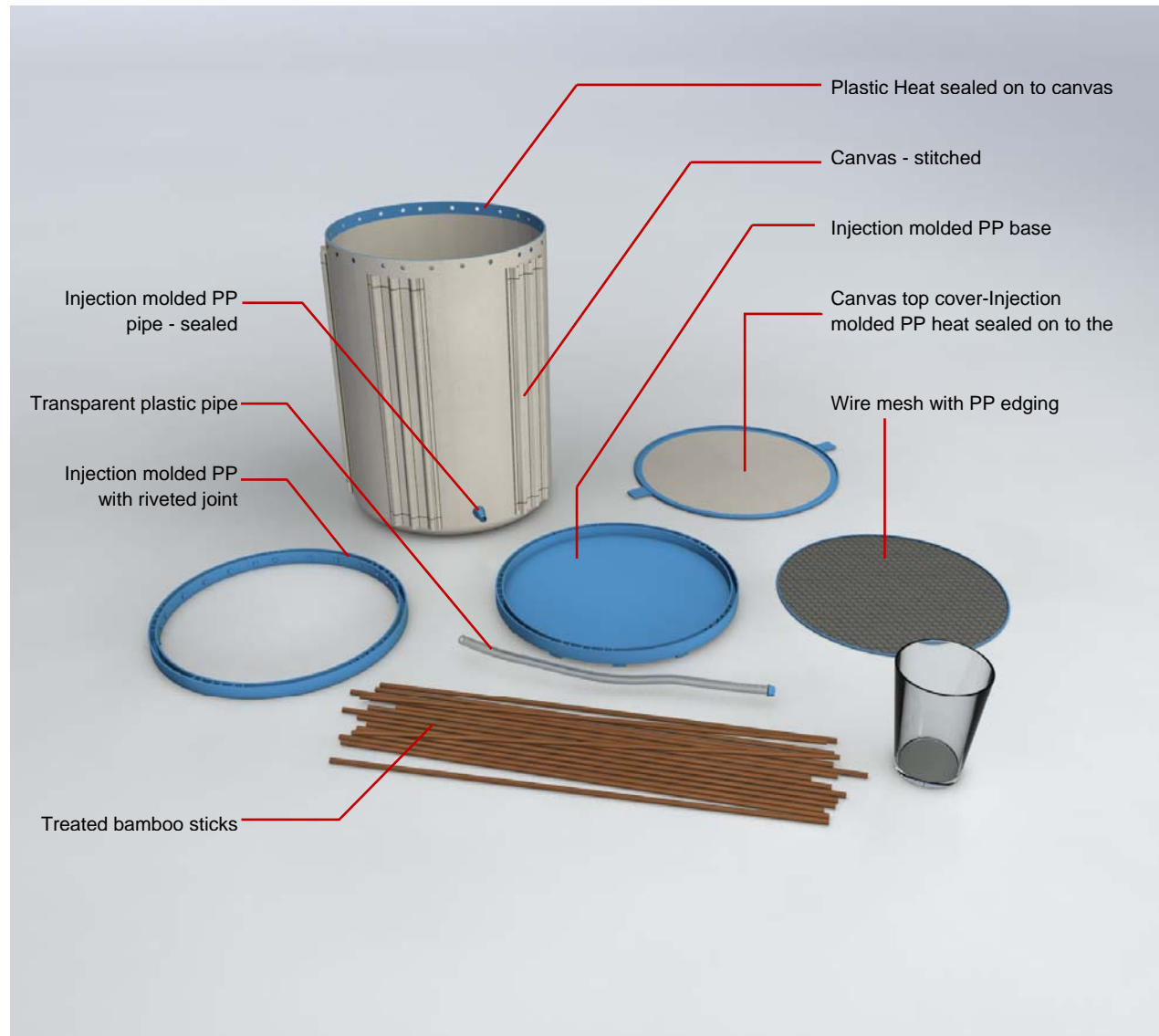
Product in its scenarios



Product in its scenarios



### 5.2.4 – Details



### 5.4.5 – Cost of the product

The Basic cost to make product is as follows;

1. Canvas – Rs-120/mtr	- Rs-40
2. Bamboo sticks	- Rs-15
3. PP Injection molding Top	- Rs-08
4. PP Injection molding base	- Rs-10
5. PP Injection molded canvas side	- Rs-05
6. PP Injection molding top cover	- Rs-05
7. Bottom wire mesh	- Rs-10
8. Pipe and tap connector	- Rs-15
9. Stitching work	- Rs-40

Total cost – Rs-148

Industrial cost (mass production)  
– 70% of cost approx.

Cost of product approx - **Rs-100**

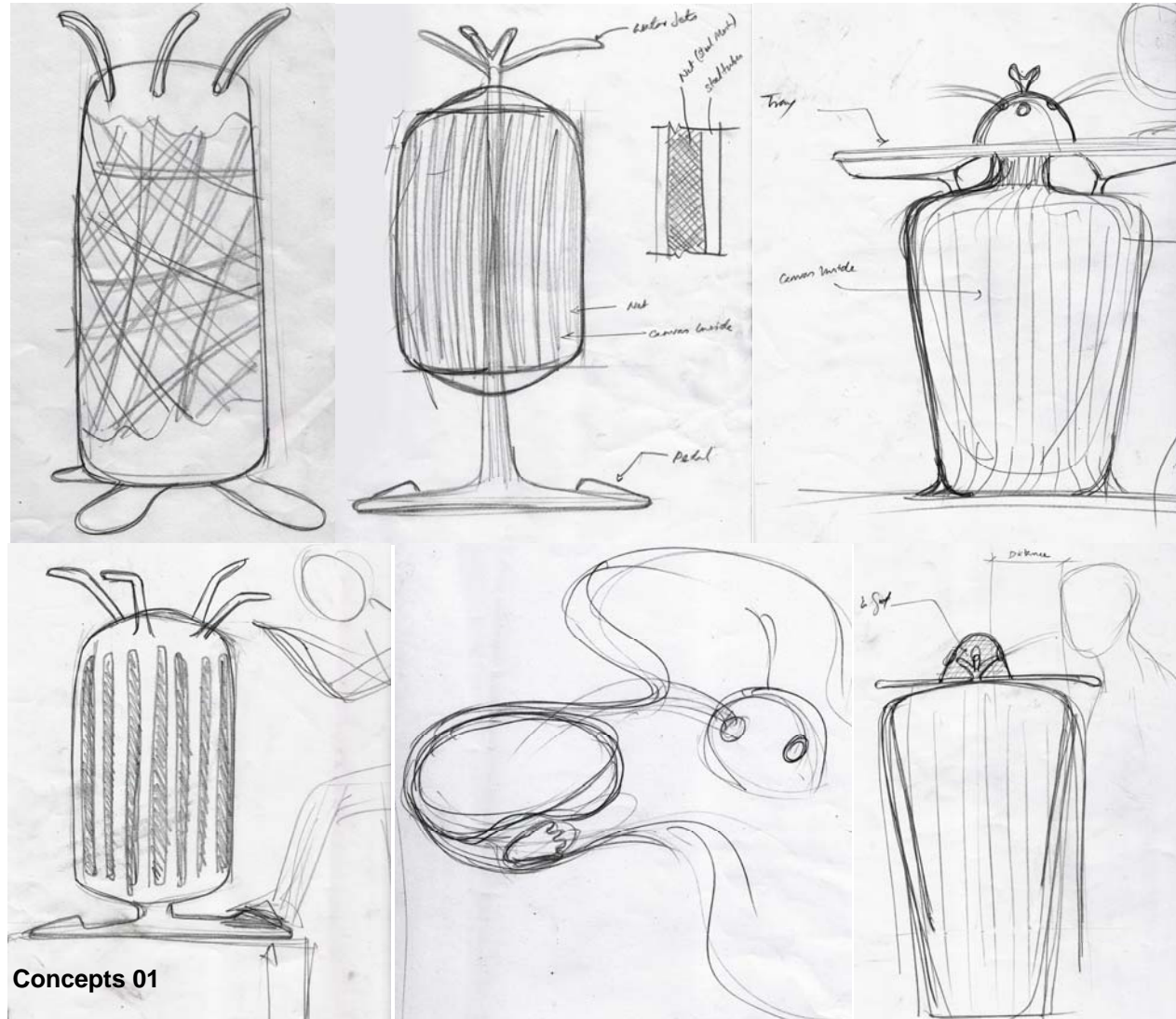


## 5.5 – Public place (Pyao)

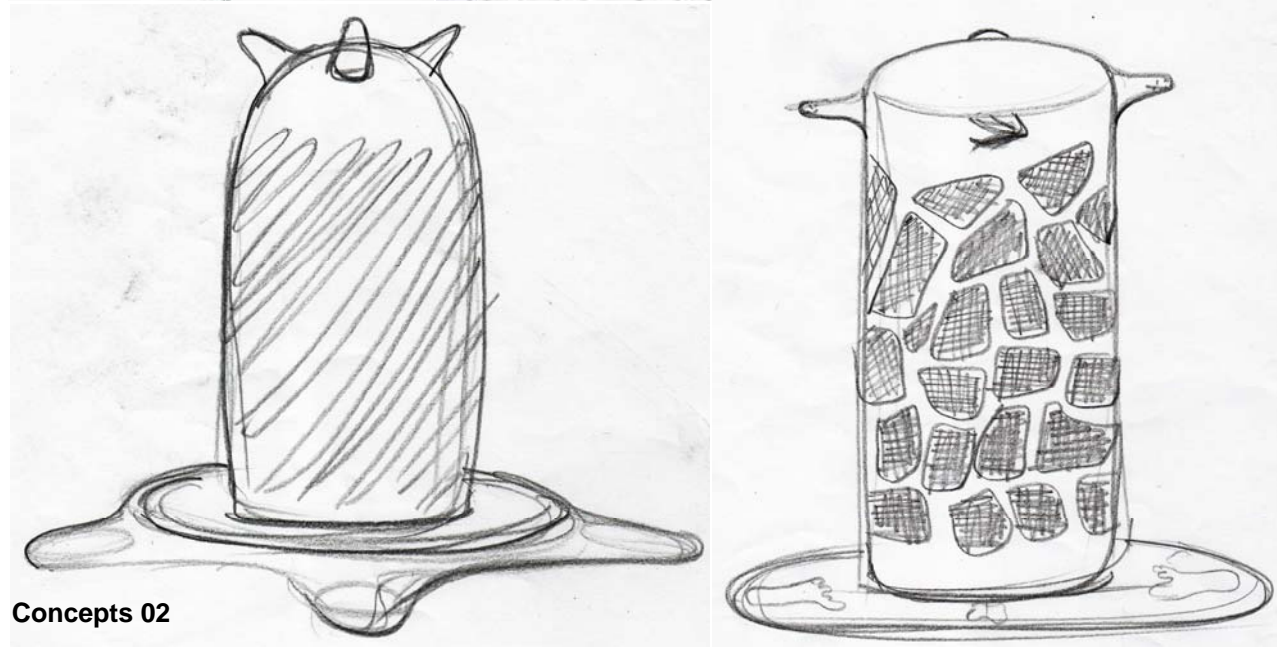
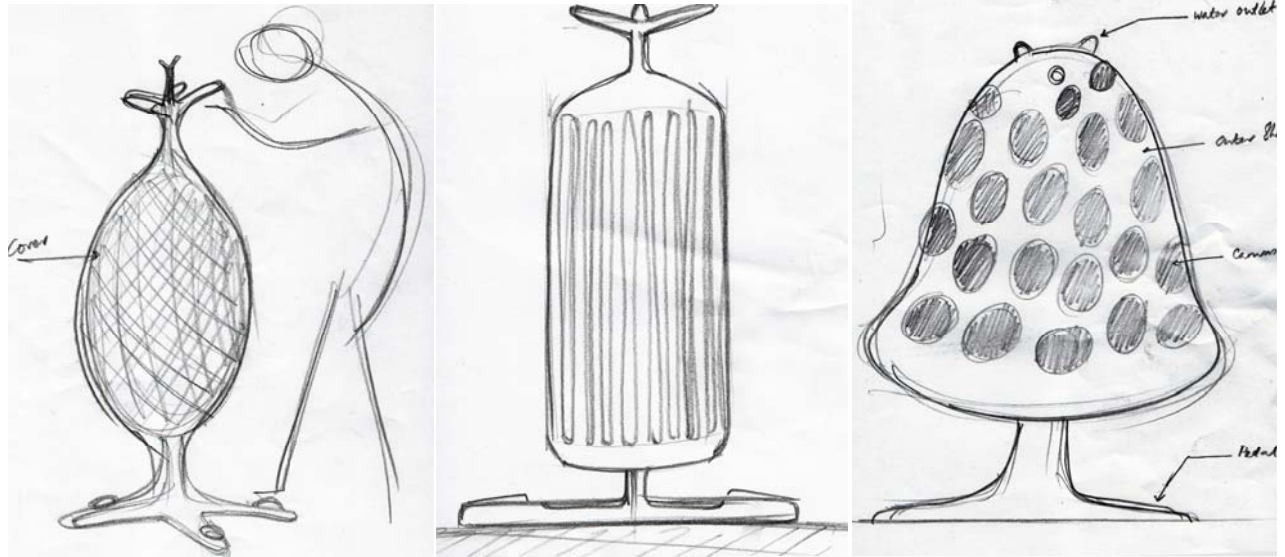
### 5.5.1 - Concept Generations

Different concepts were explored by trying out different forms.

Some of Initial concepts are as follows;



Concepts 01



**Concepts 02**

Some more concept form explorations with Indian culture and natural things, like mushroom, shivalinga, bird nest etc...



5.1.1.A. Cultural study



Figure 5.1.A – Man drinking water from a stream



Figure 5.1.B – Well inside

Public place always have great influence of culture, so each element and product of public place have a story about the culture which it holding, so first thing I did after some initial concept creations is the image study of Indian culture with drinking water, it started from drinking from streams and natural water bodies, then to wells and now to the pipe water. So my journey is started off with form related concepts



Figure 5.1.C– Public water supply system



Figure 5.1.D – Well

5.1.1.A. Cultural study



Figure 5.1.E – Girl drinking water from bore well



Figure 5.1.F – Different water tanks



Figure 5.1.G – Bore well



5.1.H – Step Well - India

More image study on culture and drinking.

5.1.1.A. Cultural study



Figure 5.1.I – Nariman point - Mumbai



Figure 5.1.J – Bore well



Figure 5.1.K – Drinking water Olden days

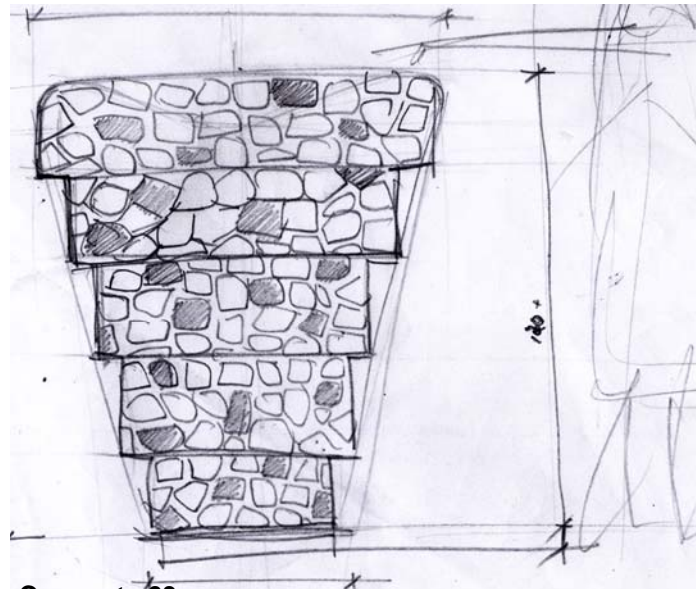


Figure 5.1.L – Village woman getting pipe water

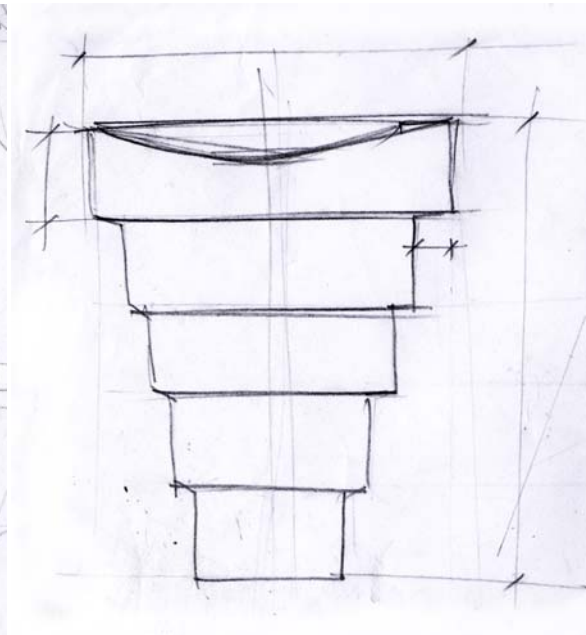


Figure 5.1.M – ElaNeer (Coconut water)

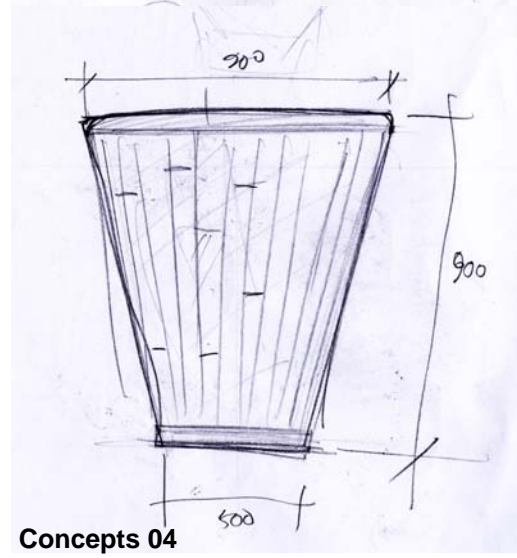
Some more images showing the relation of human and drinking water, also the Fig 5.1.I has shown the relation of water and land.



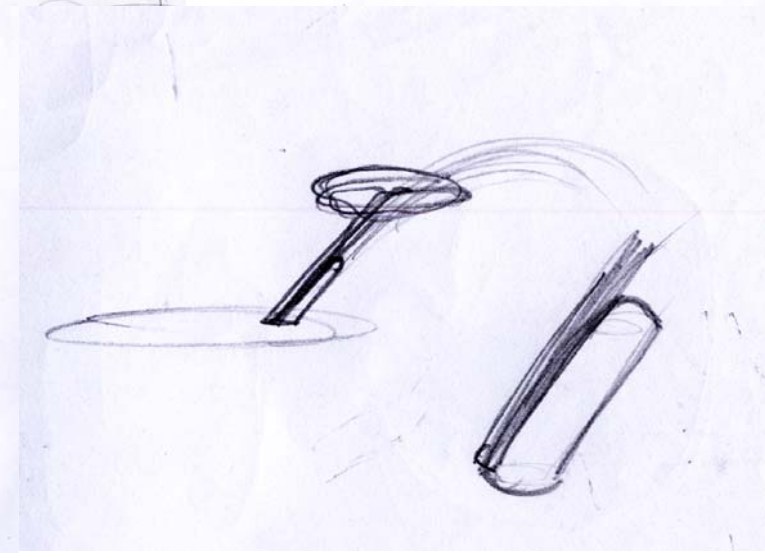
Concepts 03



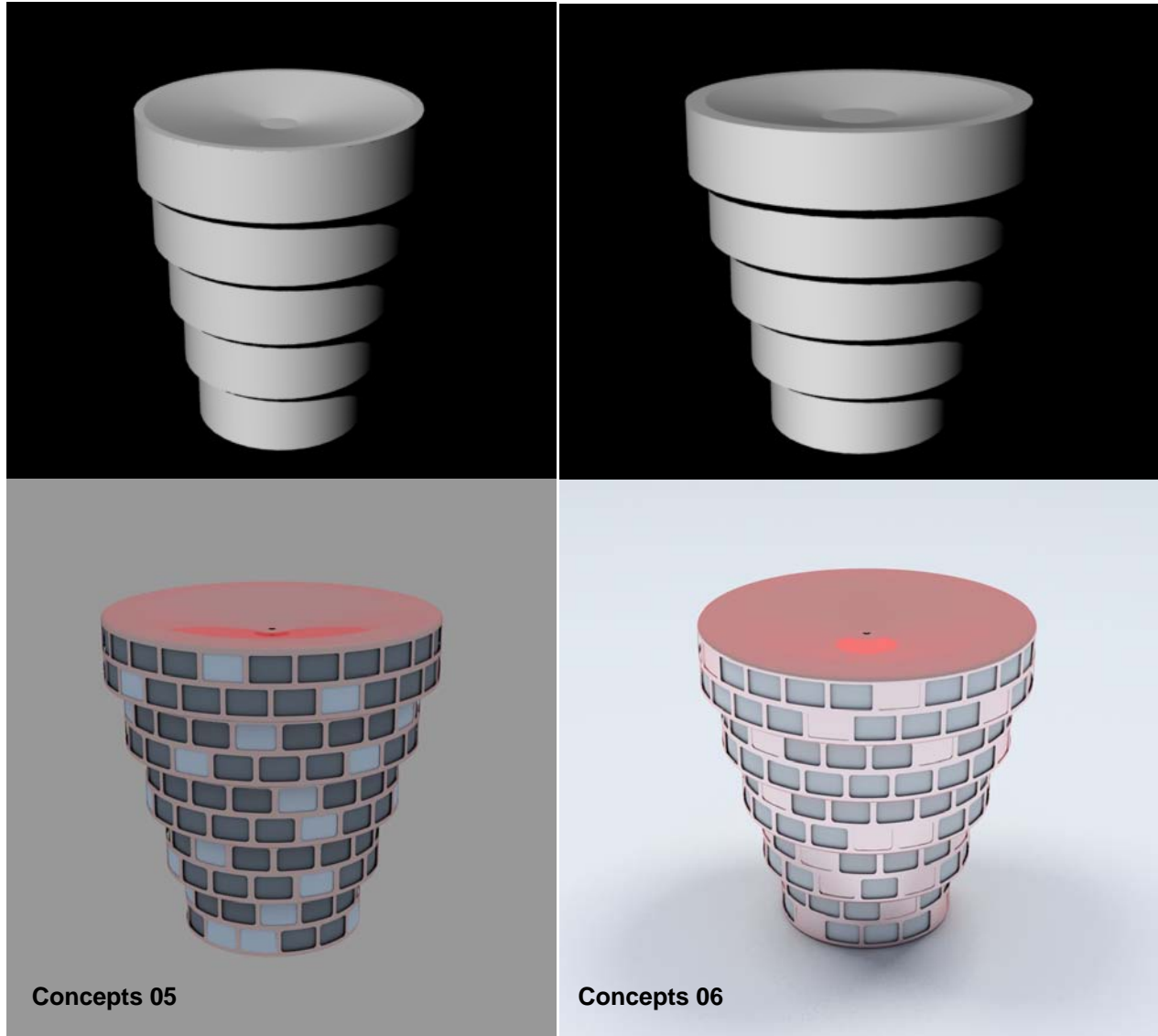
After initial concept creation, started looking at Indian wells as inspiration from where people started to take drinking water. So I took the invert part of the well and its stepping made of bricks and natural stones.



Concepts 04



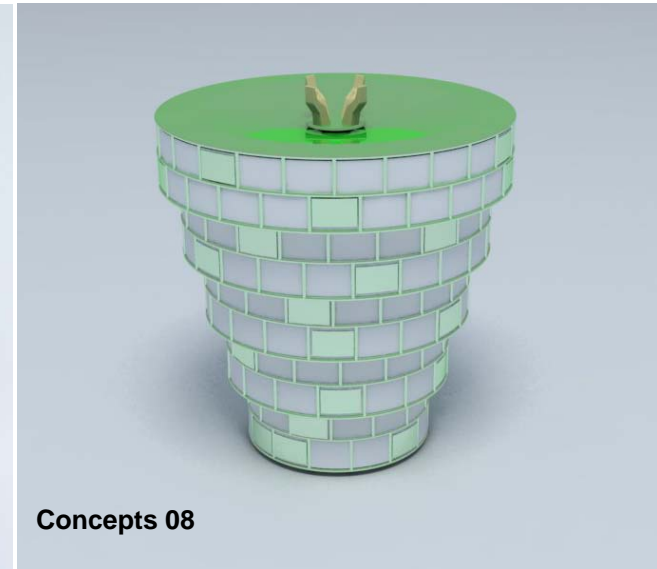
Some of initial rendering exploration or the journey of the design;



Renderings were done to better and clear the quality of concepts; initially concept was explored with taking inspirations from the well steps and the brick laying patterns.



Concepts 07



Concepts 08



Concepts 09



Concepts 10

More explorations were done on well form; the number of rings and the pattern of the rings are varying in each concept shown. In concept 07 and Concept 08 the rings are tapering down till the end, but in concept 05 and concept 06 keeping the bottom ring same as just above ring give totally a different aesthetic.



**Concepts 11**



**Concepts 12**

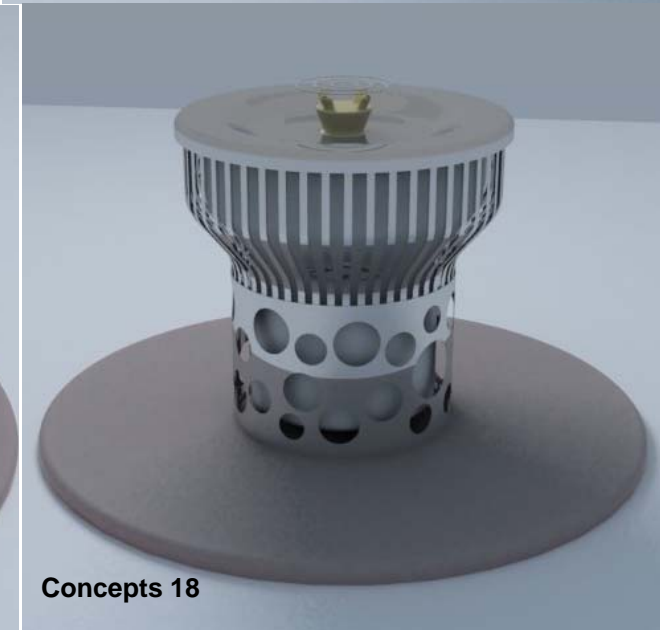
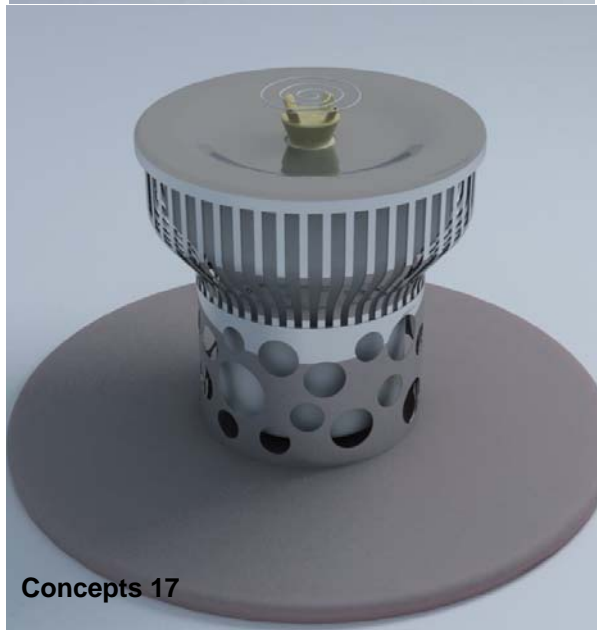
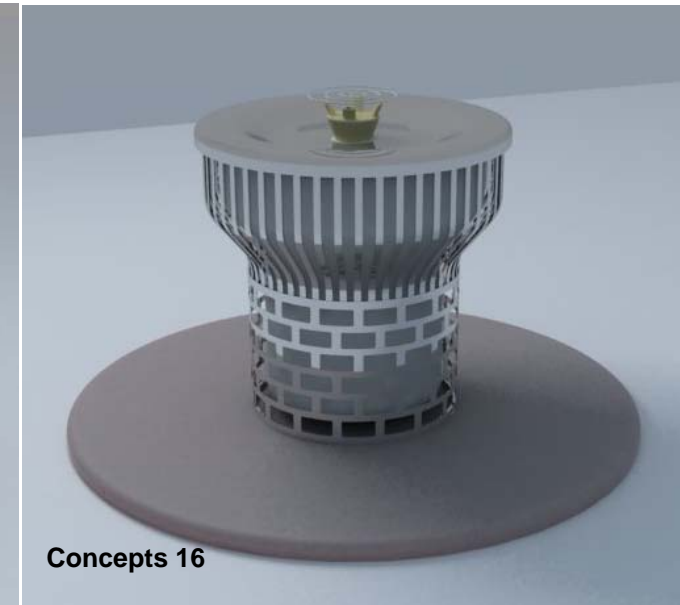


**Concepts 13**



**Concepts 14**

The shown concepts in this page are explored with the more abstraction works of wellness in the product. The well steps are abstracted to a gentle slope and the brick patterns were abstracted. In concept 12, concept 13 and concept 14 the steps were again introduced to get the feel of the well steps, which are a part of wells.



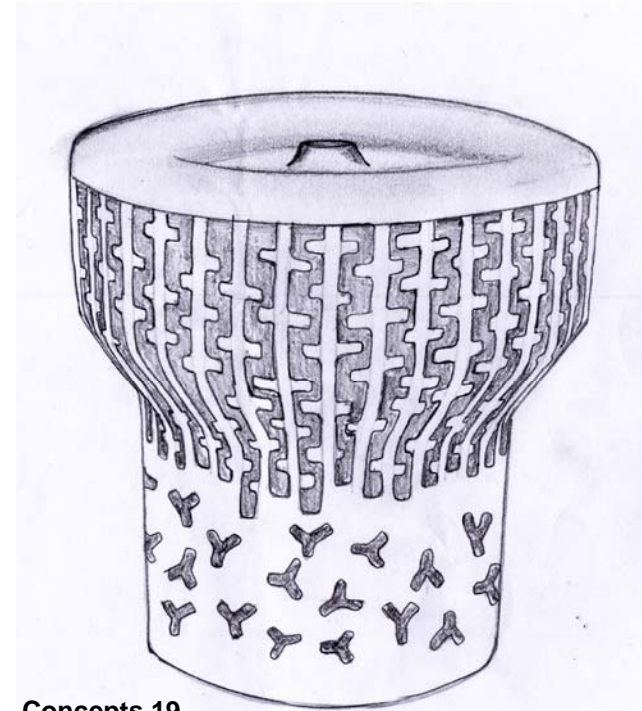
These concepts were explored to visualize the integration of top element and bottom ring. In concept 15 bottom ring is kept as plane without any patterns, which reduces the cooling of water in the canvas because of restricted air flow. So the concept 16 provides a brick patterned holes, and in concept 17 and concept 18 the water droplets are abstracted in the form of circles.



In concept 19 the bricks are well abstracted in the top element and the bottom ring is inspired from the large concrete stones in Nariman point – Mumbai, where people are directly interacting with water and land.

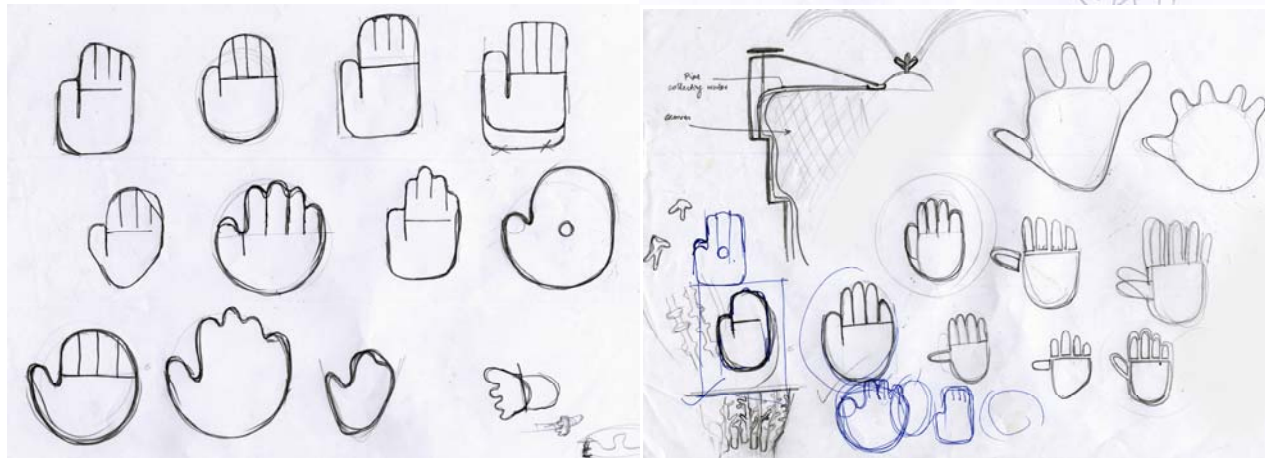


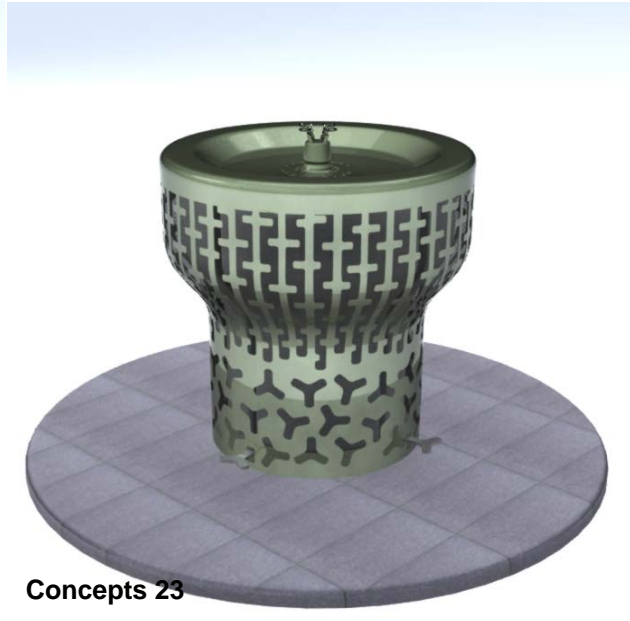
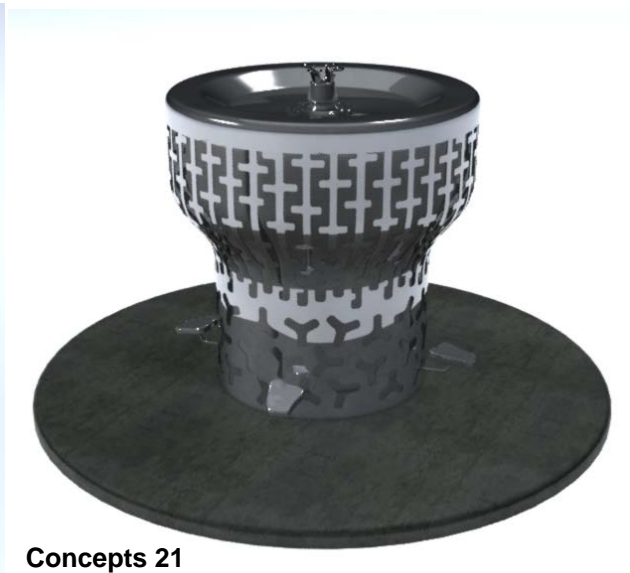
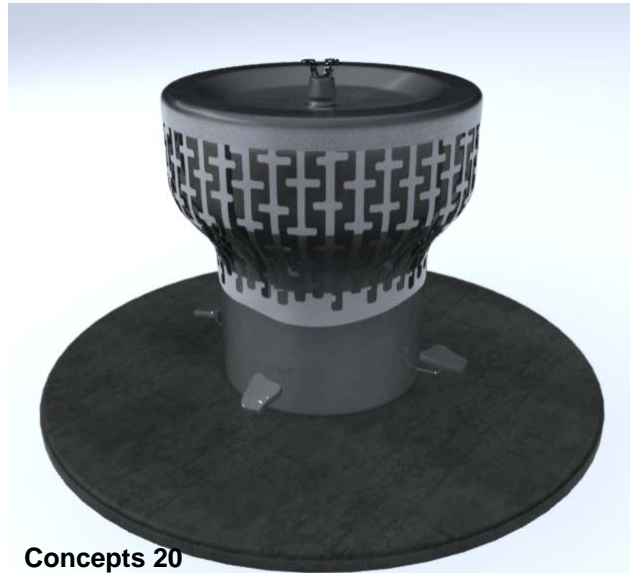
Figure 5.1.N– Nariman point - Mumbai



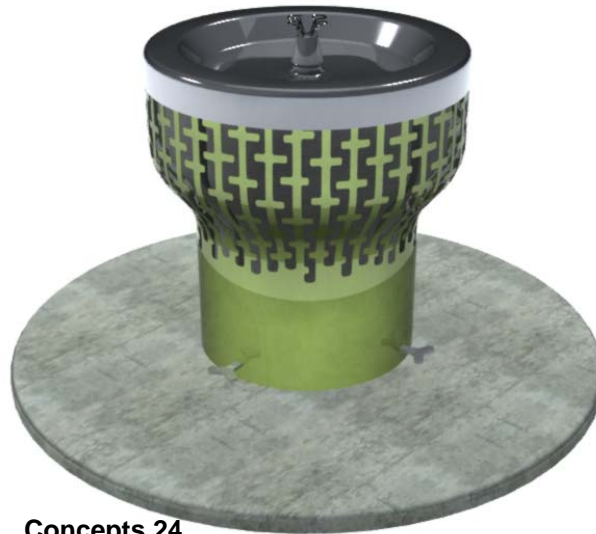
Concepts 19

Below shown are the concept explorations worked out for the hand press to operated the public drinking water fountain or Pyao, which later changed to foot pedal for the convenience and easy usage of the product.

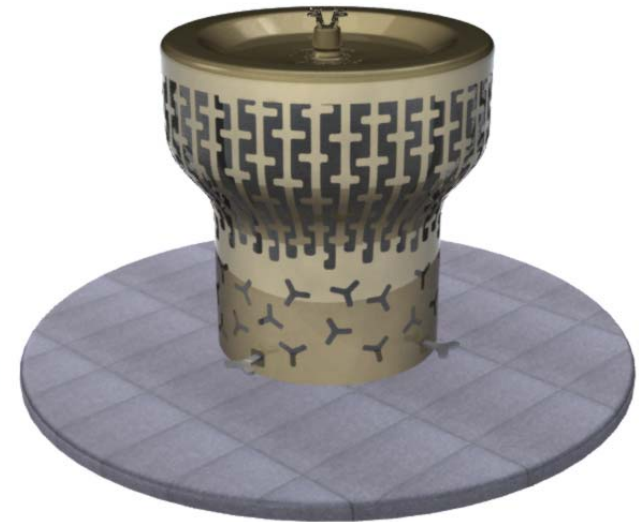




Some more explorations to visualize the design of the pedal and the bottom ring in the public water fountain / Pyao.



Concepts 24



Concepts 25



Concepts 26

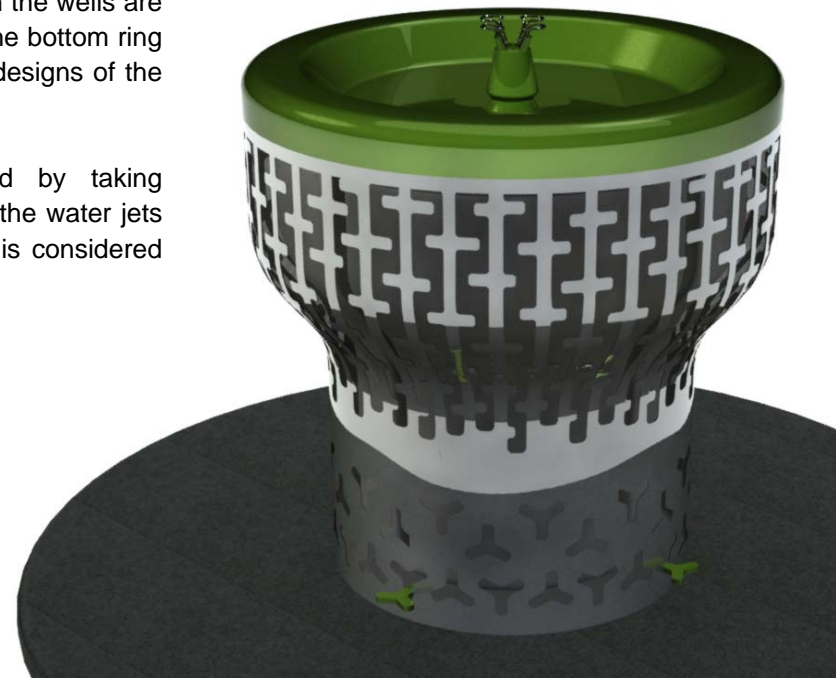


Concepts 27

Different patterns are tried out with the same element in the bottom ring and you can also see the revised pedal design which integrates with the bottom ring patterns.

Concept 28 showed is continued as the final design concept, the brick patterns in the wells are abstracted in the top element and the bottom ring pattern also finalized including the designs of the pedal.

Water outlet cluster is designed by taking inspirations from the lotus bud and the water jets are coming from the bud, as lotus is considered as a sacred flower in Indian culture.



Concepts 28



### 5.5.2 – Design

Design renderings



Design renderings



### 5.5.3 – Scenario

Product in its scenarios



Product in its scenarios



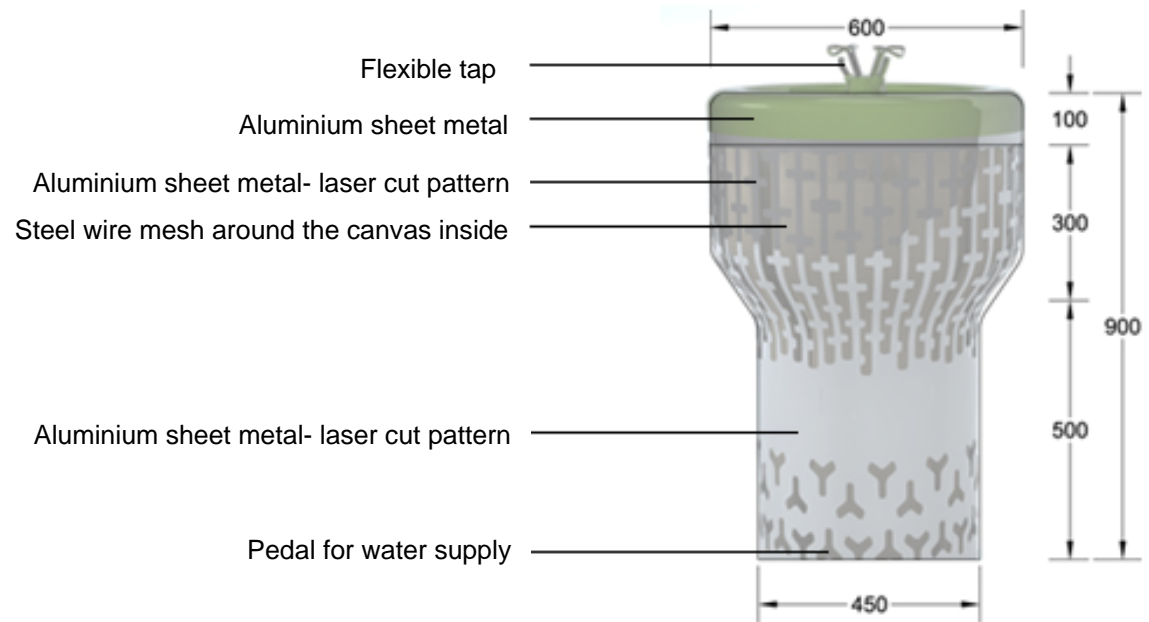


### 5.5.4 – Inspirations

Inspirations of the product



### 5.2.5 – Details



## 5.6 – Product branding

Brainstorming and mind mapping were done to prepare a brand name for the product category.



From these Names the final Brand name for the product chosen as ElaNeer. Elam means cool and Neer means water. Fresh Coconut water is referred as ElaNeer in Malayalam language.

**ELANEER**  
natural water cooler

## 6. Prototyping

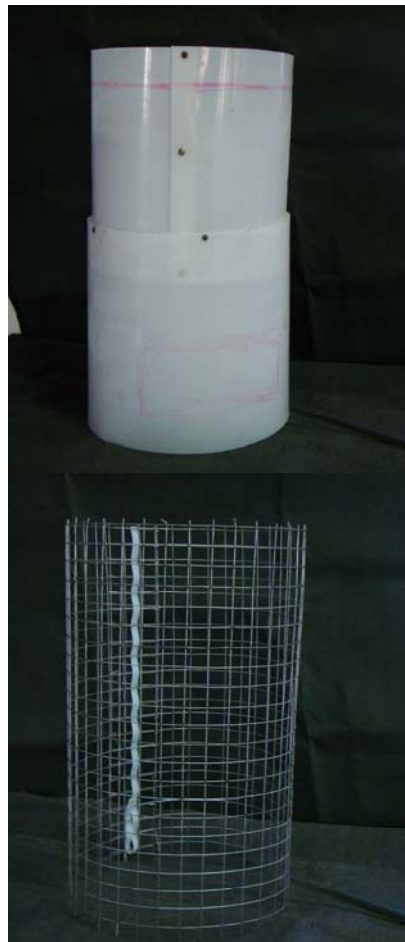
6.1 – Explorations

6.2 – Final Prototype

## 6.1 - Explorations

Initially different exploration mockup was made to test the Canvas quality and the water carrying capacity and aesthetics and functionality of the product.

After checking these explorations only the final prototype is made. The explorations carried out are as follows;



More explorations



More explorations





## 6.1 – Final Prototype

Final prototype of ElaNeer-Cost effective was prepared.



## 7. Conclusion and Future scope

7.1 – Conclusion

7.2 – Future scope

## 7.1 - Conclusion

ElaNeer is a range of products which serves as a natural water cooler as its primary function and it creates different aesthetic and experience to the people. Each product is developed with proper metaphor and the product is well communicative and simple in nature.

ElaNeer water coolers will add a mark to Green design happening all over the world and serves its purpose.

## 7.2 – Future scope

The future scope of ElaNeer is very wide open. There are lots of products that can be developed by using the concept. ElaNeer - *Cost effective* can be further developed as a water purifier and water cooler by adding filter candles which are cheaply available.

ElaNeer - *Public* is having a great scope in the Indian future where common men are not having proper public drinking water system and that too cool water. NGOs and other companies can take forward this concept and install these natural water coolers which can be very much useful for the Rickshaw people and common men.

## 8. References

8.1 – References

8.2 – Table of figures

## 8.1 - References

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2. Green Design: Design for the environment by Dorothy Mackenzie
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Paper by Jayasree Pakhare - 2007
4. <http://en.wikipedia.org/wiki>
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## 8.2 – Table of figures

- Fig. 1.2.A - [www.buzzle.com/](http://www.buzzle.com/)  
Fig. 1.2.B - <http://en.wikipedia.org/>  
Fig. 1.2.C - [www.artisanplr.com/](http://www.artisanplr.com/)  
Fig. 1.2.D - [www.worldofenergy.com.au/](http://www.worldofenergy.com.au/)  
Fig. 1.2.E - [www.allamericanpatriots.com/](http://www.allamericanpatriots.com/)  
Fig. 1.2.F - <http://images.google.co.in/>  
Fig. 1.2.G - <http://images.google.co.in/>  
Fig. 1.2.H - <http://en.wikipedia.org/>  
Fig. 1.2.I - <http://images.google.co.in/>  
Fig. 1.2.J - [www.makingthemodernworld.org.uk/](http://www.makingthemodernworld.org.uk/)  
Fig. 1.2.K - <http://s4.hubimg.com/>  
Fig. 1.2.L - [www.makingthemodernworld.org.uk/](http://www.makingthemodernworld.org.uk/)  
Fig. 1.2.M -  
<http://geothermal.marin.org/GEOPresentation/>  
Fig. 1.2.N - [www.savingearth.co.cc/](http://www.savingearth.co.cc/)  
Fig. 1.2.O - <http://sustainablecities.dk/en/>  
Fig. 1.2.P - <http://aq48.dnraq.state.ia.us/prairie/>  
Fig. 1.2.Q - <http://images.google.co.in/>  
Fig. 1.2.R - <http://knol.google.com/>  
Fig. 1.2.S - <http://www.lancs.ac.uk/ug/hussainw/>  
Fig. 1.2.T - <http://gasprices-usa.com/>  
Fig. 1.2.U - <http://images.google.co.in/>  
Fig. 1.2.V - <http://images.google.co.in/>  
Fig. 1.2.W - <http://www.organizedatoz.com/>  
Fig. 2.1.A - <http://aavaas.com/>  
Fig. 2.1.B - <http://images.google.co.in/>  
Fig. 2.1.C – open source  
Fig. 2.1.D - <http://rdprd.gov.in/>  
Fig. 2.1.E - [www.designboom.com/](http://www.designboom.com/)  
Fig. 2.1.F - <http://lh6.ggpht.com/>  
Fig. 2.1.G - <http://rdprd.gov.in/>  
Fig. 2.2.A - <http://aavaas.com/>  
Fig. 2.2.B - <http://hawayehi.com/>  
Fig. 2.2.C - <http://images.google.co.in/>  
Fig. 2.2.D - <http://susty.com/>  
Fig. 2.2.E - <http://1.bp.blogspot.com/>  
Fig. 2.2.F - <http://www.onlygreengear.com/>  
Fig. 2.2.G - open source  
Fig. 2.2.H - <http://img.alibaba.com/>  
Fig. 2.2.I - <http://www.traveldriplus.com/>  
Fig. 5.1.A - <http://www.mayin.org/>  
Fig. 5.1.B - [www.flickr.com](http://www.flickr.com)  
Fig. 5.1.C - <http://www.sahilonline.org/>  
Fig. 5.1.D - <http://images.google.co.in/>  
Fig. 5.1.E – [www.flickr.com](http://www.flickr.com)  
Fig. 5.1.F - <http://images.google.co.in/>  
Fig. 5.1.G - <http://graphics8.nytimes.com/>  
Fig. 5.1.H – [www.flickr.com](http://www.flickr.com)  
Fig. 5.1.J – [www.flickr.com](http://www.flickr.com)  
Fig. 5.1.K – open source  
Fig. 5.1.L – <http://images.google.co.in/>  
Fig. 5.1.M – <http://images.google.co.in/>  
Fig. 5.1.N – [www.flickr.com](http://www.flickr.com)



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