Design of Transportable Catering Equipment

Product design

Project II

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APPROVAL

The product design, project II entitled
' **Transportable catering equipment**' by **Anand Asinkar**, is approved in partial fulfillment of the requirements of the Masters of Design degree in Industrial Design

Guide :

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Chairperson :

Internal examiner :

External examiner :

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I would also like to thank my friends who gave me their ears and time when it was crucial for them.

Abstract

The project is aimed at developing a design in the food industry, essentially catering industry. It is an attempt to identify a potential niche in a small catering service where investing in equipment is the most important thing. It is also an attempt to develop and identify an area where design has been overlooked. The study which leads to a single solution might not be the best solutions but keeping in mind the users and factors.

CONTENTS

1. INTRODUCTION

INTRODUCTION

Food catering

The Indian culture, tradition and religion since the past has brought people together to celebrate every occasion, may it be festival or prayer or special occasions of eating together for meetings or casual dinners.

Serving food to invited people is a part of our tradition. Mass eating is event specific like; marriages, birthdays to after death events. They also include events like corporate parties and business lunch. Serving hot food is considered as a respectable and fresh cooked food.

The food culture has been pursuing the changes in the development ,Which are evident in the past decade or so. May it be occasions on Institutional basis or at a family level, the large scale food preparation Is always associated with the union of people in places and events.

Food service has always been a necessity when on the move or away like the development of catering service on railways, roadways and airways. Other forms like industrial catering, catering in schools and colleges, health care and medical facilities and also mobile catering units.

Thus it is seen that not only marriages like in the past is the biggest occasion for the involvement of a food service, but it is also the wide aspects of life that may be religious, family, social or casual events that become a part of our life. The size of families also started reducing and the burden on working women could no longer be handled. This gave an opportunity to the catering establishments to extend their services in the form of not only food but also arrangements both indoors and outdoors.

The development of the industry is very haphazard according to the needs of the society. This in turn results in the unfair deal of eating outside as a holistic experience.

Catering outdoors

Traditionally the Indian way of serving food is by *pangat*,which the guests sit on the floor and food is served, or is called food service men. But over the years to create an image or a grandeur, influenced by the western civilization, the food display culture has been incorporated in the Indian society.

Thus a feast hosted can have two kinds of services. One is *pangat* (now on tables and chairs) and the other buffet service in which the guests have to help themselves on the food counters who are in turn served by the service personnel.

Development

A drastic development is seen in the kitchen as compared to the service. That means development in the kitchen equipment for food preparation with specialized and modern equipment, whereas the outdoor catering has hardly undergone any development. There has been a development in the service equipment where there is no need of transportation. Thus there are a lot of compromises by means of temporary arrangements for special occassions.

The experience

As far as quality and quantity are concerned, the client is more concerned about them.

Some of the aspects that are overlooked are,

Location of the food counter,

The kind of food,

Struggling activities to keep with the demands of guests,

The spillovers and temporary storage,

Exposure of shabby handling of food,

No visual coherence of the food counter,

Poor display of food,

Confusion on the menu,

The long queues of the guests,

The manhandling of food,

Makeshift counters

all these are ignored.

It is quiet often forgotten that it is not just a physical activity of eating but an experience in itself.

The embarrassment of having to jostle for food stuffs cannot be wiped out even by the most tasteful of meals.

The surrounding physical environment contributes a lot to building up an atmosphere.

THE PROJECT

Need for design of transportable equipment

From this we can draw an inference that a suitable catering equipment for transport and special occasion needs to be designed

The requirements of people eating outside keep changing

To cope with this the food industry has to keep in pace with the demands

As far as mobility with services is concerned not much developments

Such development is clearly seen in mobile means like air or rail

Food service-discharge of duties

Client-faster, good quality by equipment, better services

Caterer-flexible equipment for wider range of services

Faster arrangements and better arrangements

Aim and objective

The design of a transportable food service equipment for outdoor occasions of catering

An experience for self service of food through neat presentation and display of food

Breaking the monotony of straight conventional food counters

Saving energy by providing aid for the service personnel

Create a back counter for behind the counter activities

Efficient handling, holding and serving of food also in hygienic manner

Flexibility to use as a center display counter

Create an ambience by creating a visual identity for different occasions

Scope

The scope of the data collection is limited to

A random study of outdoor catering functions and procedure.

Organizations as well as discussions with food service personnel, caterers, decorators, clients, guests, catering service academics, etc. in mumbai and suburbs only.

The project will be limited to;

A students work, and final output will be in the form of a scale model for the proposed design.

2. DATA COLLECTION AND ANALYSIS

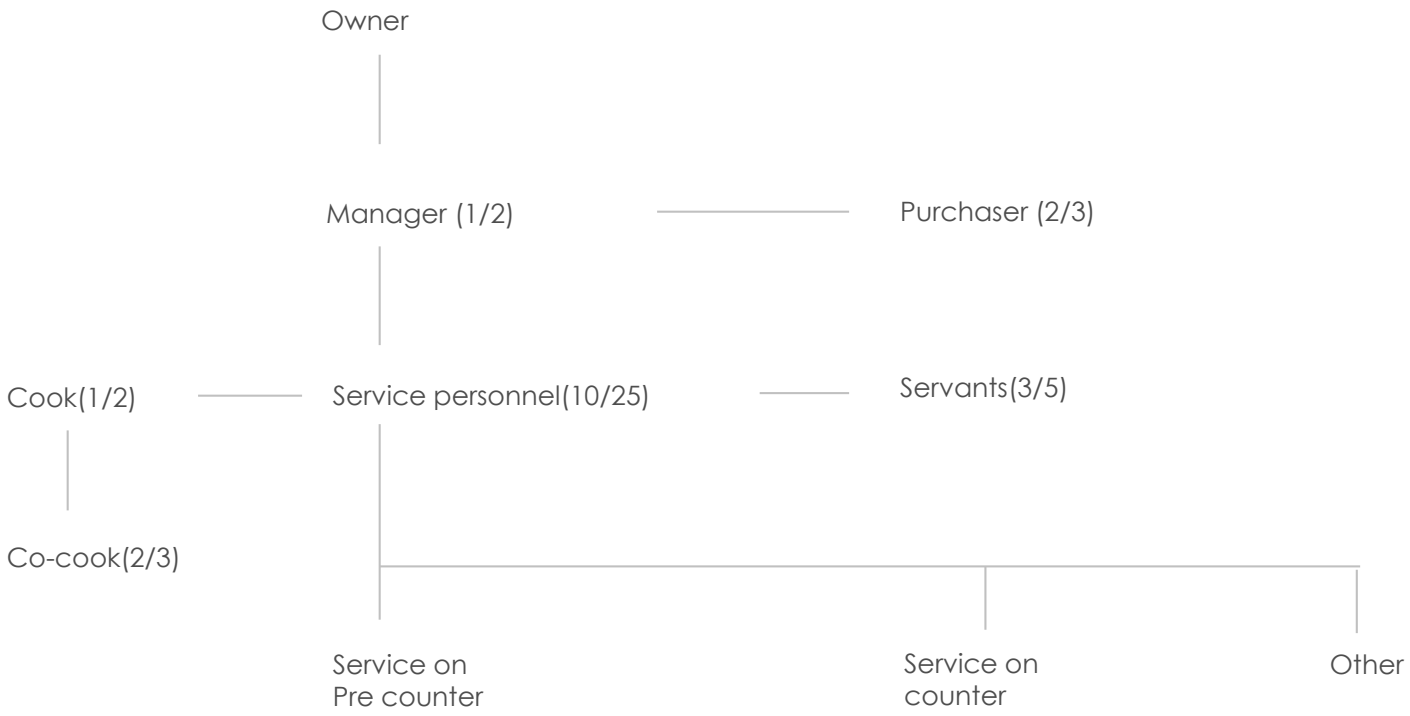
(I) Catering

Kinds of outdoor services

There are broadly different kinds of services depending on the kind of services, they can be shown as,

Transport raw-material	⇨	Preparation on site And serve
Prepare and transport Half cooked 50-90 %	⇨	Final cooking 50-10 % and service
Cook 100 %	⇨	Only service

Structure of a catering service



A catering assignment is based on the following

What is the occasion

No of people

Menu(lunch /dinner/plate food/breakfast)

Menu vegetarian / non-veg

Client budget

Place of catering

Area available

Catering service on target occasions

SOCIAL(casual)

Society meets

One day trips

Republic Day

Independence Day

SOCIAL

Institute meets

Casual dinners

Annual days

Lectures

Workshops

Corporate meets

Musical concerts

FAMILY

Birthdays

New year

Engagements

Marriages

Religious

Vegetarian recepies

A Single menu could have 6/7 or at times 8 parts in it.

Rice	Dry	Wet	Sabji
Jeera rice Veg fried rice Veg pulao Rice kheer Pea pulao k. pulao biryani	Chappati Bread Bread rolls	Palak Dal (sauce/gravy)	Chanamasala Manchurians Curries /kofta

Sweet	Salads	Different scenario
Pudding Halwa Jamun Kheer (Fruit salad)		Rice Dry veg Wetveg Sweet Fried Liquids Salads Achar/salt etc

Veg. recepies

Approximate units required

Food counter

8 as per menu
dividing it sufficiently
1 unit= 2 menu(items)
multiples can be used

Trolleys for dish /katoris
Back fry heating counter
Storage collection trolley.

(2) Routine assignment for catering

After fixing of the occasion and venue.
The client finalizes the menu for the occasion with the caterer
From this point the caterer assignment can be broadly divided into

Planning

Preparation

Transportation

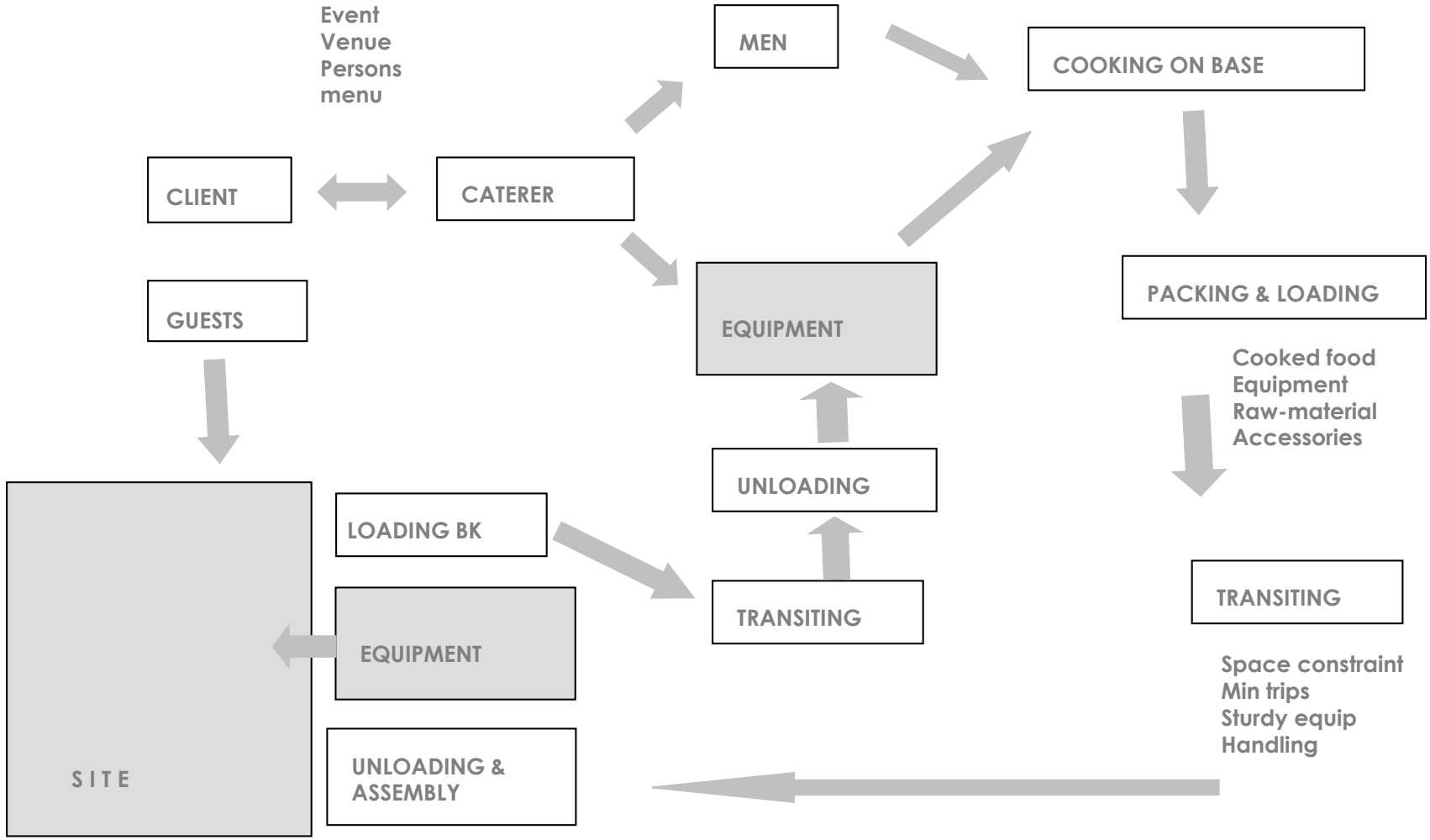
Set up on site

Service

Packaging up /cleaning

Back transport

The event


Event
Venue
Persons
menu
MEN
COOKING ON BASE
CLIENT
CATERER
GUESTS
EQUIPMENT
PACKING & LOADING
Cooked food
Equipment
Raw-material
Accessories
UNLOADING
LOADING BK
TRANSITING
TRANSITING
EQUIPMENT
Space constraint
Min trips
Sturdy equip
Handling
SITE
UNLOADING &
ASSEMBLY

-

Planning

According to the menu the caterer has to plan his assignment for various reasons, like whether one or more assignments are at a time, the amount of equipment to be engaged for an assignment, the no of people required for the assignment etc.

Preparation

The food most of it is for the target occasion is prepared on the assignment place, but in the main base kitchen itself. According to the menu the food served on site may vary from 80% to 100% that means most of it is prepared in base kitchen and then transported. This implies that transportation of not only the equipment for food counter and chaffing but also food service and preparation equipment needs to be carried.

Transportation to

The transportation is for the range of operation the caterers cater to it varies from 2km to 5 km or up to 10kmalso. It includes carrying of service equipment, personnel, cooking equipment and people.

-

Set up on site

Mostly the service counters are placed in the open, but sometimes the place is covered with a shamiana, or sometimes it is indoors also. the setup includes erection of pandals, setting up of food service area, washing cutting on site, preparation of cooking area.

Service

The lengthiest procedure that the caterer immediately engages in his activities mentioned above of all the arrangements. The client has to inform the caterer1/2 an hour or an hour before the service actually starts. The simultaneous operations of heating and support activities for the main counter begin when the food service actually starts.

Packing of cleaning

The end of service is given by the client when all the guests have had the food. Cleaning up of tableware and dismantling of canopies and decoration, clearing of cooking vessels and service areas, loading into vans or available medium.

-

Transportation back

Dismantling the pandals and counters. Just the service doesn't mean the work is over for the caterers; it is only half way done . The equipment needs to be arranged . currently it is the personnel who very roughly handles the equipment.Since they are exhausted and we have to still pack up things , clean and carry them back. For this the factors of ease of disassembly , light weight and transportable with less space occupancy come into picture.

Inference

It is inferred that out door catering is very different from the permanent catering . therefore, the design of equipment for them will be different from that of permanent catering. The equipment should essentially have a slight touch of celebration and eating as a phenomenon. The equipment should be flexible to cater to wide range of occasional meals and menus. Transportable from base to site and back, easy assembly /disassembly, light weight, knockdown, flexible decorations to cater to a wide range of occasions.

(3) Case Studies

Questionnaire

- Structure and working of a catering service
- Occasions
  - numbers
  - no.of outdoor occasions
  - no.of people
- Range of outdoor movement
- Arrangements
  - client
  - caterer
- Different kinds of menus
- Means of transportation of equipment and food
- Usual procedure of cooking
  - precooking, warm and cold menus
- Fuel consideration
- Transporting cooking and service equipment
- Segregation of areas
- Provision of water
  - do they carry — availability
  - preparation — drinking
  - washing

Case studies

Medium size catering service

Similar catering service

The Taj flight kitchen

The Taj outdoor service

Manufacturers

LL equipment, b'bay

Sune Bangera, andheri

Scene behind the food counter
Dabbas used as bulk storage on the floor
Change of chaffing dishes in front of the guests
Cluttered look on the table top

Case study 1
Medium size catering service

The catering service was essentially a medium size setup i.e. owned by a single owner or the caterer under who would be the manager who would look after the arrangements. Another person appointed would be the purchaser. The next hierarchy would be divided into 3 of them ; the cooks, the service personnel and the helpers. The cook would also have sub cooks under them.

The percentage of targeted occasions would be 15 – 20 % of the total number of occasions. The outdoor service would be in two forms
Food with service
Food by parcel

Some of the occasions ; 15th aug, 26th Jan, 31st dec, meetings, b'days
No. of people served; 10 – 100 to 500.
Important considerations for expenses; men, utensils, raw materials and time.
Range of operations, 5 – 10 kms. Sometimes more than 30 kms. Also
Menu ; refer booklet pattern.
Means of transportation, 3 wheelers/ 4 wheelers/ small truck, depending on the occasion and no. of people.
Only frying operation done on the site, leads to carrying equipment like stove, gas cylinder, kadhai and kaltha for frying menu like samosa/puri/papads.
Fuels required would be gas, Lpg & chemicals for buffet.

The only cooking equipment for frying

Equipment required to make puris on site

Loading scene in the tempo rickshaw

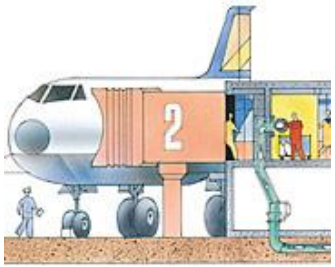
Equipment of buffet
Installation equipment
Food counter with huts
Washbasins portable
Tables & clothes

About 80 % of the outdoor occasions are buffets
Assurance of hot food thus transparency, transparency in preparation.
Equipment reflection of hygiene & also through people and service.

Unloading of the equipment from the vehicle.

Kind of vehicle used to transport

Usually everything is carried in a single vehicle in two to three trips



Case study 2
Taj flight kitchen

Why flight kitchen?

The most unique thing about flight kitchen is the design of food for transport. It is the ultimate design of food and equipment for transportation. The whole design of the flight
Kitchen is oriented towards transportability of food. It is this requirement that makes the equipment more to carry the food, hence transportable.

Capacity to handle 30,000 meals a day.700 flights a week.
Prepared food is packed and stored in cold store.
Different airways will have different menus.
The flight kitchen caters to multiple airways.
The prepared food is in the form of menus placed in designed plates to hold all the items.
This is sealed and stored in cold freezers.
The food when in flight is warmed in ovens and then served.
Liquid food like tea and drinks are carried in kettles or containers in trolleys designed to hold the food.
The cold food is stacked in trolleys which hold the stacked food in stacks. The trolleys are designed to hold and transport the food.
The trolleys act as storage, transport and service equipment for the flight catering.

Plastic crates stacked for storage of raw food and transported on trolleys

Pre-cooked food I.e. cut vegetables stacked in freezers

Food material stored in a fashion that the old food is not left behind

The top surface acts as tray, the plates are also distributed and collected while moving the trolley from the aisle.
The trolleys are designed in specific standard sizes to hold plates of various sizes.
In the cross section of plane e.g. airbus 7 trolleys can fit when lined up.
These are moved through the aisles.
There are various kinds of trolleys, closed, open and ovens.
The trolleys have 4 wheels at the base, with foot operated brake engage / disengage mechanism.
Lined up along the wall of the truck and held by the rope
Ramps and loading unloading without lifting any of the trolleys
Trolleys act also as collection of used plates, so immediately cleaned and disinfected and washed for reuse.

Food packed on conveyor belt

Prepared food plates fed into the trolleys

In-flight trolleys Ready to be dispatched

Trolleys loaded in the catering trucks through the bays

Inside the catering truck

Soiled trolleys back to the flight catering unit for refilling

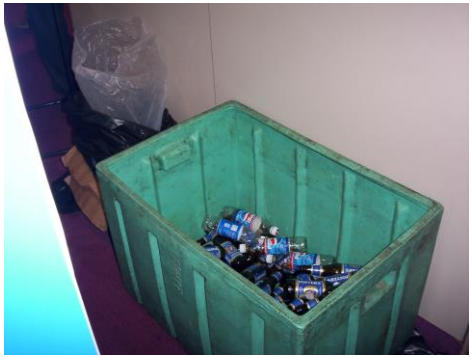
This case study was conducted for the following reasons,

Transportability in this catering service
Transport of food & equipment
To get hints from the system like
Retaining of food while transport
Food & service not a celebration but a necessity
Just like a mobile food counter
The whole system is designed for movement right from menu to service
Design of compactness of equipment and menu board
Functionality as priority

Case study 3
Taj outdoor service

Sub food counter

As seen in the picture, a sub counter for preparation is provided. This is to keep the mess away from the main service counter. The disorganization created by the procedure of preparation is kept away from the sight.



Plastic trays

Plastic trays used to store and also carry material

Service counter required behind the main counter, usually for preparation of food.

Hectic preparation activity going behind the main counter.

Frying equipment kept on the counter behind.

The frying unit electric operated.

Use of microwave

Buffet equipment used to keep the food warm.
They are fueled by the chemical

Case study 4
Small Catering Service

Scene behind the counter and in front
Food of the kept grounded
No visual harmony for the counter

Space below the counter not used since
not enough height available

Often activities like washing and cooking
not desired to be seen when food is
served, go unnoticed

Lack of visual harmony

SS chaffing dishes used with no aesthetic valve

An open food counter without the hut

Not a hygienic place to store food

Use of PP crates to carry bulk food vessels

Chaffing dishes used for storage to save on volume of space

Analysis of the data

Excluding the flight catering, for transportation, tha nalysis can be given as;

Wide number of catering services were studied.

Despite wide variety of occasions, menu and budgets, the scale of the event, all the cases threw same format of function.

Similar food service equipment.

The menus would decide the equipment to be carried on site.

To serve hot food, the equipment needs to be carried to the site.

In case of precooked food, serving it warm is important.

Usually the main service counter is supported by a preparation counter behind.

Material on service counter

Buffet based on menu

Service and containers for menu

- Rice
- Dal
- Vegetables
- Soup
- Sweet
- Fry
- Additions
- Supplementary

Buffet equipment

- Container
- Container cover
- Service spoon
- Water container
- Stand,burner
- Chemical
- Forks
- Small containers

Other

- Plates
- Bowls/katoris
- Glasses
- spoons

Cooking equipment

Only fried menu prepared on site

Equipment

Flat wide vessel
(to mix flour)

Latni and flat

Stirrers 2/3

Rinser vessel

Large spoons

Kadhai

Forceps

Cloth/rags

Cooking

Heavy duty Stove

Gas cylinder

Menu for cooking

Puris

Flour and kanik carried t the site

Flattened

Fried on site

Samosa/ vada

Prepared at base

Carried in a container

Fried on site

Papads

Ready made packs used

Fried on site

1) Design for the specific recepies (vegetarian)
2)Depending on the number of people, the frequency of change can be given for each of the recepies.

	Rice	Chapattis	Sabji	Sabji	Sweet	Salad	Miscellanious	
Container	Rectangle / circle	Independent container	Rectangle / circle	Rectangle / circle		Open	Depending on type	
Heating	✓	✗	✓	✓	✗/✓	✗		
Covering	✓	✓	✓	✓	Depends	✗		
Self-service/ Service	s	s	s	s	s	s.s	s.s	
Size of the container	4 lit	~ 4 lit	4 lit	4 lit	2 lit	open	Open/ less than 1 lit.	

(4) Users

User requirements

Owner	Service personnel	Guests
Cost	Time	Organization
Organization	Assembly/dis assembly	Product interface
Image	Transport	Communication
Hygiene	Cut down micro level activity	Hygiene
Time	Organization	satisfaction
multiplicity	Hygiene	

User profile

Client interaction

The choice of the caterer is done by the client himself. It is mostly through social interaction. The criteria for the caterer would be; number of people, what occasion, the menu to be finalized, budget and place of service.

The client also has specific needs other than the menu for which he is charged extra e.g.; the chaffing dishes, crockery, aerated water, fancier decoration, etc.

According to the layout of the place, the caterer and the client decide the area to be allotted for the installation of the equipment. The caterer conveys the client the amount of tables required which the caterer gets by himself or hires it.

Caterer and decorator

The catering organization tie up with a decorator permanently. Although the caterer has to work professionally with the decorator's team hired by the client for the occasion. The distribution of responsibility between the decorator and the caterer is as follows,

The decorator charges lump-sum or per unit area of the pandal and is responsible for;
Setting up decoration of the pandal.
Provision of furniture and furnishing including requisite number of tables for catering
Provision of hand wash etc.

The caterer charges per head for the meal served and is responsible for;
Layout and arrangement of the food service area.
Decoration of the food service tables.
Procurement of food provisions, its cooking and preparation.
Food holding, handling and serving at requisite temperatures.

(5) Existing equipment

Study of existing food service equipment.

The study of existing food service equipment included, the equipment in use, its manufacture and also browsing through the internet.

The study can be categorized into;

Existing tables

Equipment in use

Manufacturers (LL and Sune)

Web

The pictorial presentation of the tables is given;
they are essentially tables not on the move but made so with use if castors, with limited mobility range. Whereas the tables used by the caterers are knockdown kind of tables for stacking and disassembly.

A wooden table with MS frame Combinations to form different Widths and lengths of food counter

The existing table

Dimensions:

Used for the buffet counter

Service counter

Glasses table

Display table

Preparation counter

Appliance table

Used as pangat table also

Advantages

Flexibility of use

Arranged in length and breadth for various uses

Rough use

Compactness

Disadvantages

Uneven surfaces, Unstable

Procedure of opening, Safety

Material not ideal, Life of the table

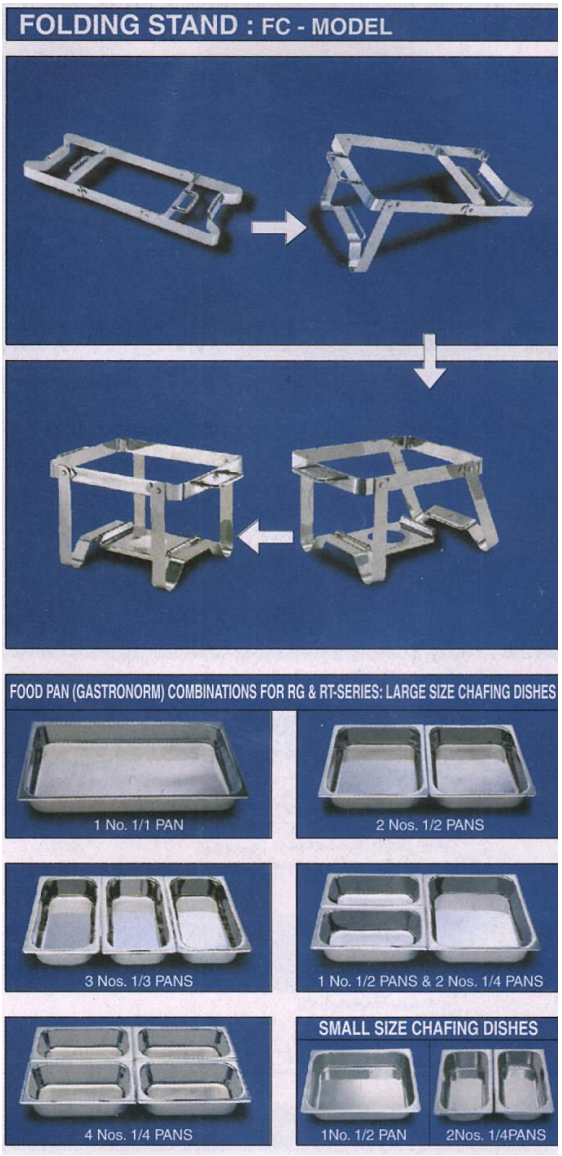
Food counter tables used as centre table for additional food taking.

Structure of the existing chattri or hut.

Stack ability of the table for storage

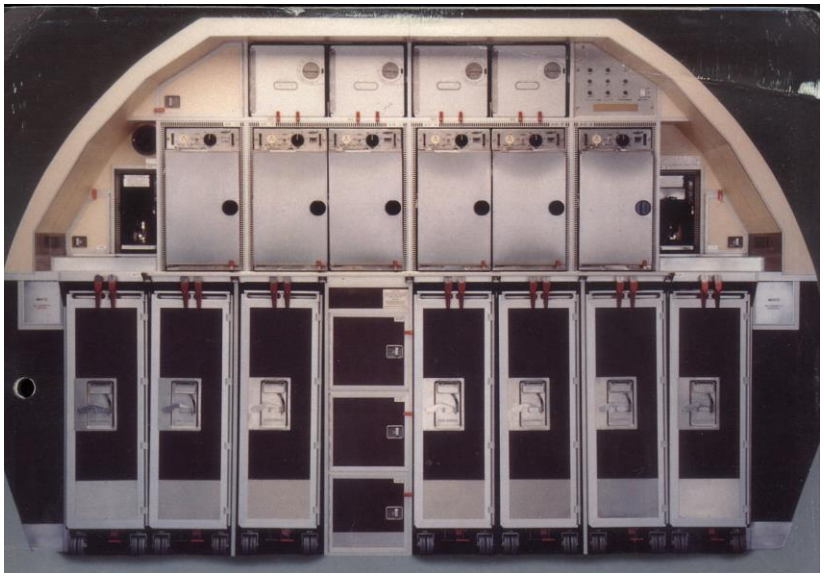
Two persons required for the assembly of the table

Kinds of chaffing dishes



L L Equipment

For the desired number of people,the appropriate volume containing chaffing dishes



Flight catering

Equipment required
in flight catering

Service in IIT hostel

SS food counter used in permanent food catering facilities

They are not designed for mobility

Services required behind the food counters. For transport and also a service counter

Preparation on the back counter

A mobile cooking unit

Restaurant Gulmohar

A food counter for service given by the service personnel

Food counter trying to be given a flushed look

Behind the counter ,
Another required for
storage of plates,
cutlery, and other things

(6) The product

What the product has to offer

The product has to serve at three different levels according to the users. Since the product interacts with the user at three different forums. The three users are the owner or contractor for catering, the service personnel and the guests. According to the amount of time the user is associated with the product and also in terms of usability they are roughly prioritized as the contractor who is going to buy the product, the people in use I.e. the service personnel and ultimately the guests. The concepts have thus been generated according to priorities of each of them. But it need not necessarily follow the same sequence for concept generation.

A list of requirements according to the users has been prepared below, which the product has to offer. It is not possible to serve the purpose in all fronts, but attempt to get a larger picture.

The contractor/caterer;

The most important factor in buying such a product is to project an image for the caterer.
To show a sense of organization and hygiene.
To obviously cut down on time for the setup, so that for a multiple number of units, he can engage more units at a single time.
Multiplicity in terms of combinations according to the menus, since most of the planning is menu based, the equipment numbers can be planned for a particular occasion.

The service personnel;

Cutting down in time for assembly and disassembly.
Ease of transportation, lighter in weight as compared to the existing equipment.
Cut down in the micro level activity.
Hygiene and also making them organized.

The guests;

The product has to communicate to the user;
may be by location or the sequence of the service of food etc..
Create an image of being served hygienic food.
Sometimes the exchange of food should not be seen so that every time the guests get food into the chaffing dishes , they feel it's the most fresh food.
And ultimately satisfaction.

(7) Ergonomics

Included the study of existing equipment for ergonomic appropriateness. The table heights are 2 ½ ft. which is appropriate with the chaffing dish on top of it. Therefore the final serving height attained for both the service personnel and the guests.

Width

The table width ranges from 1 ½ ft to 2 ft which is slightly more than required. Sometimes the tables are lined up beside each other to increase the width and accommodate objects on the table, but it adds to the mess up on the table. Also larger width of the table i.e. more than 2 ft implies that bending for the service personnel and also handling of the chaffing dishes.

Counter

The behind counter activity is handled by the service personnel, e.g. cutting work and refilling of chaffing dishes which does not happen at the same level. There is bending and lifting activity continuously. This is because there is no behind counter at the same height. Also in an outdoor assignment, it is not hygienic to place the food as close to the ground. Simultaneously, the space below the counter is not used but on the ground, so off grounded storage can be created below the counter to store. E.g. Crates to store extra plates, vessels soiled, cutlery, etc.

Considerations in case of trolley

Pulling task requires twice as much compressive force as pushing

In pushing compressive forces are not affected by handle height

Optimal height for pushing is 70-80% shoulder height

Best height for pushing is 50-60% of body height

Selection of optimal pushing force of the trolley that avoids lower back loading

i.e. grabber/handle at 50-60% of the stature for max. push

Considering these values;

Optimal height between 800-900mm which is 51and 58 % of the stature of 95th and 5th percentiles respectively.

Grip diameter of 40mm is comfortable and soft grip preferred

3. PRODUCT BRIEF

From the inferences drawn from the data collected, a product brief of the following outline was arrived .

Design of a food counter for service essentially for outdoor catering

A flexible , modular and multiuse counter for food service, transport and storage for utility unit serving 50 to 200 people.

Integrated chaffing dishes of a certain volume and also provision for lighting for the counter.

Creates different layout with provision of flexibility for different menus.

The food counter is based on the volume of the chafing dish according to the target number of people.

Lighting necessary to lit the food, table top and chaffing dishes

The table allows for self service as well as being served with separate top for service equipment like spoons, etc.

Also the chafing table accommodates change in incorporating the chafing bowl, and can be flat able to use, just as a table top.

The chafing dish if not required, can accommodate similar volume for another menu.

The table essentially accommodates two chafing dishes in one table, this module can be repeated.

The design has to retain hygiene and should be easy to wipeout.

A covering over the chafing dishes, which act as protection, also for lighting and to add to the semantics of the product.

Create an image for the appropriate occasion, with the canopy which can be changed.

Modular, light weight, flexible, ease of assembly and disassembly for transportation and timesaving.

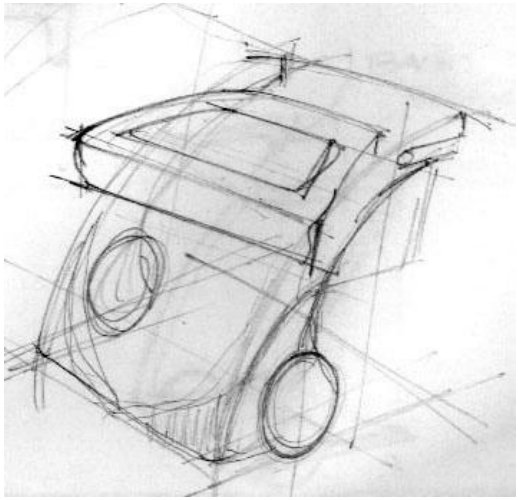
For transportation it can be with wheels or castors or knockdown and or stackable.

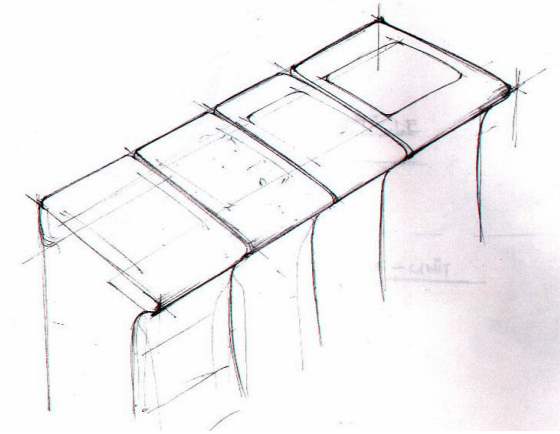
Should be able to withstand rough handling.

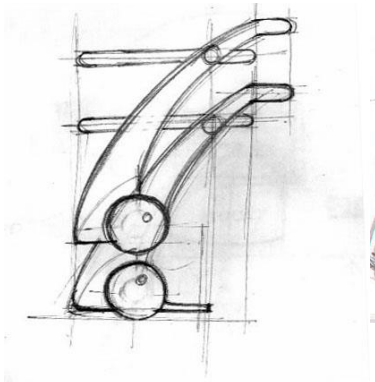
Aesthetic clean and uncluttered appearance.

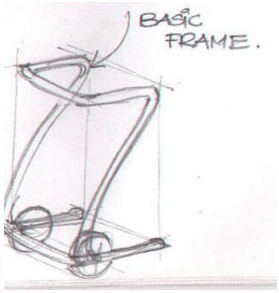
4. CONCEPTS

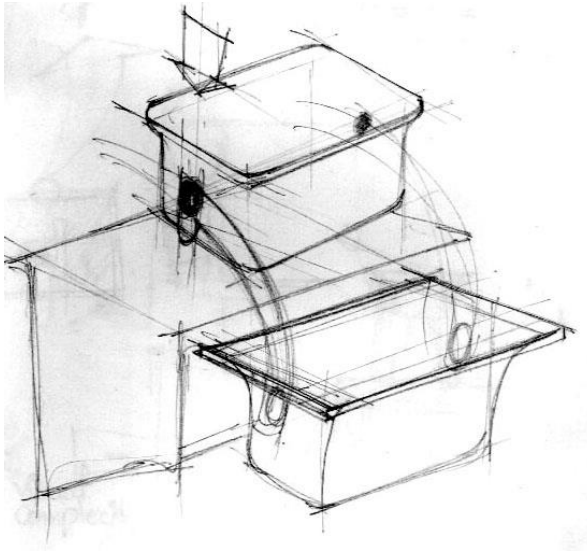
Initial Ideation in Sketches

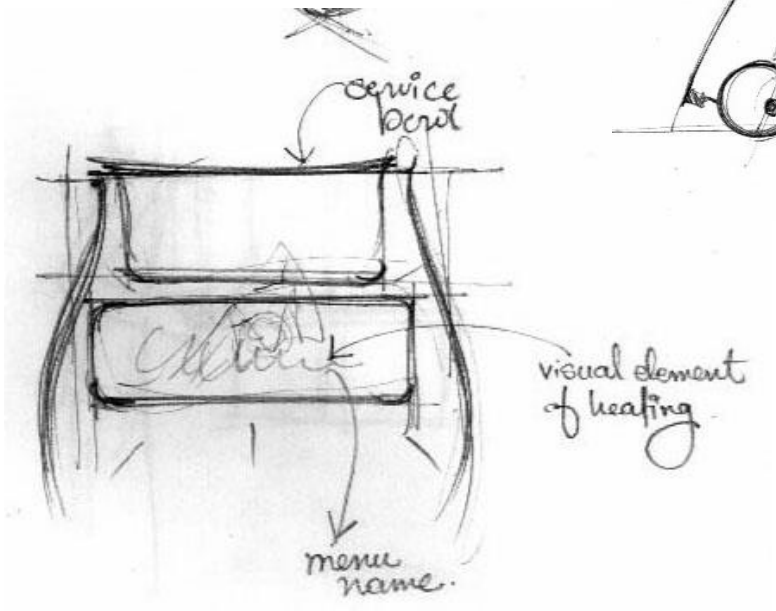


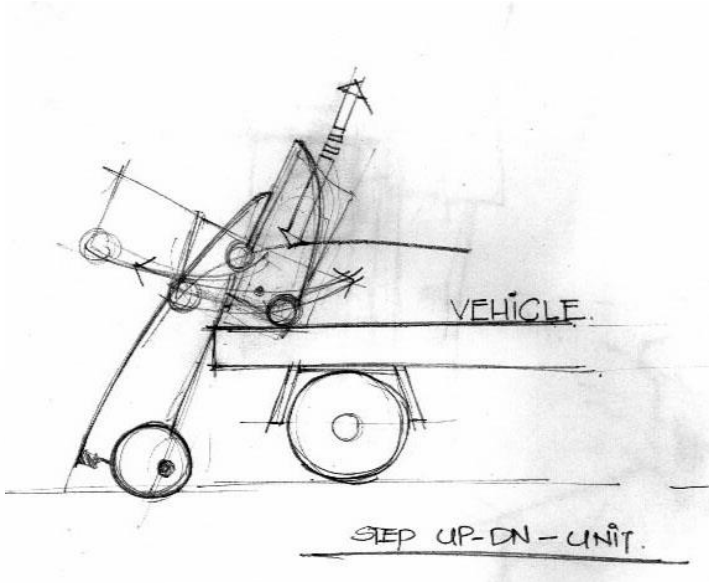


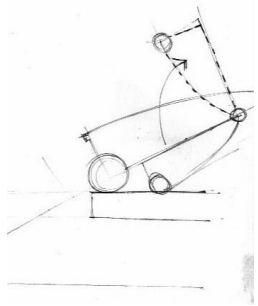


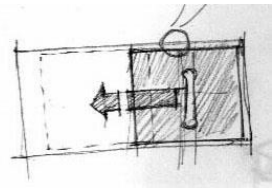


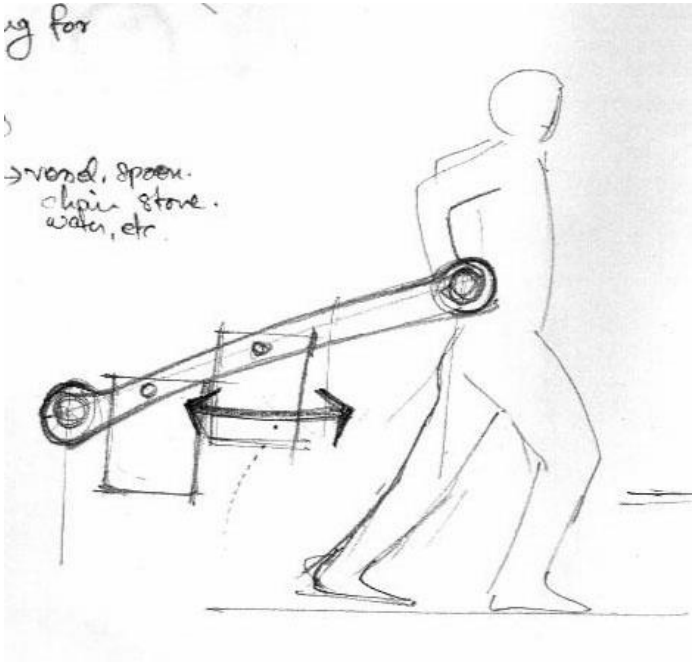


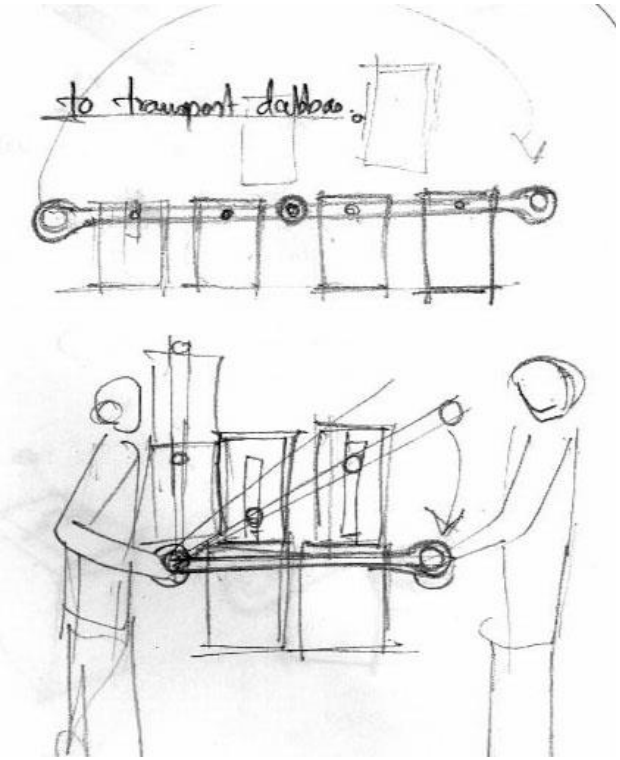

service bowl
visual element of heating
menu name.


VEHICLE.
STEP UP-DN – UNIT.

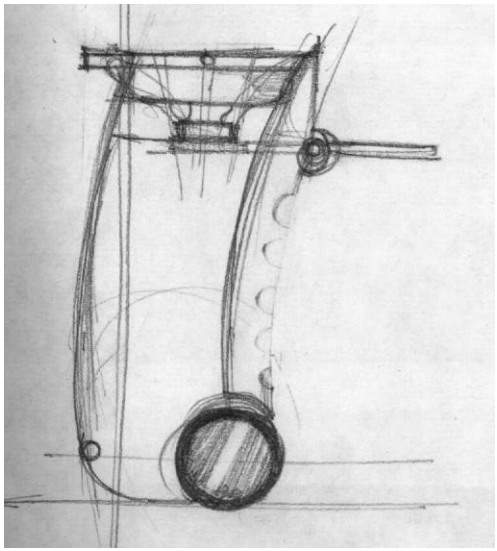


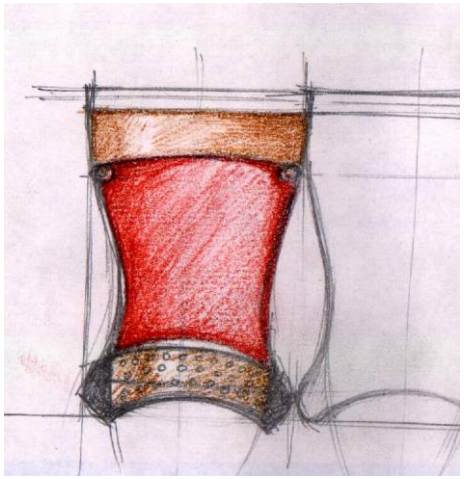


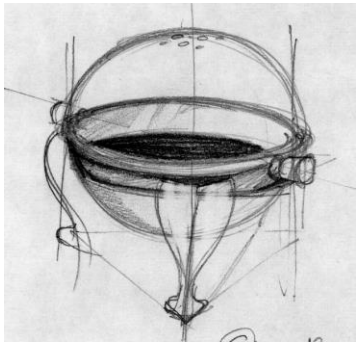

g for
→vessel, spoon.
chair stove.
water, etc

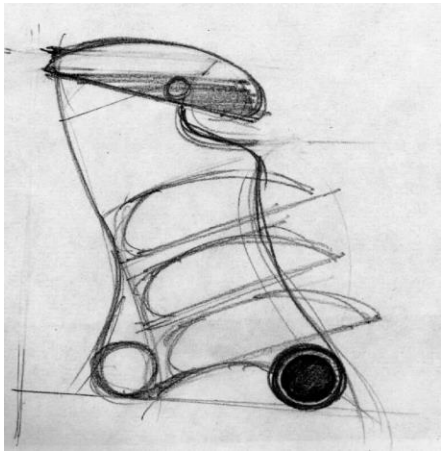

to transport dishes.

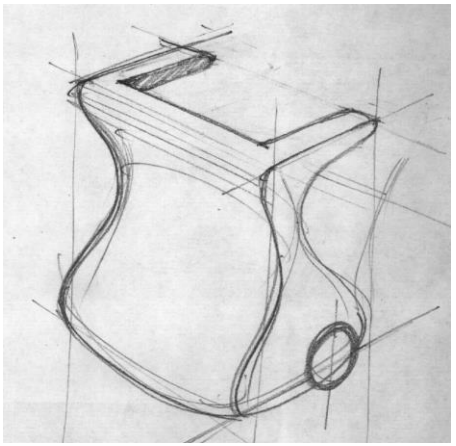
Explorations in form



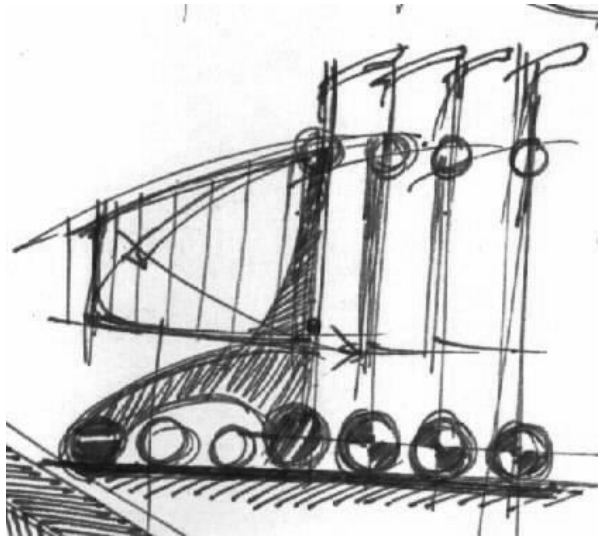


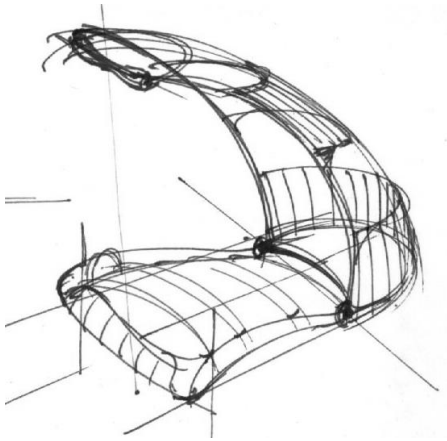




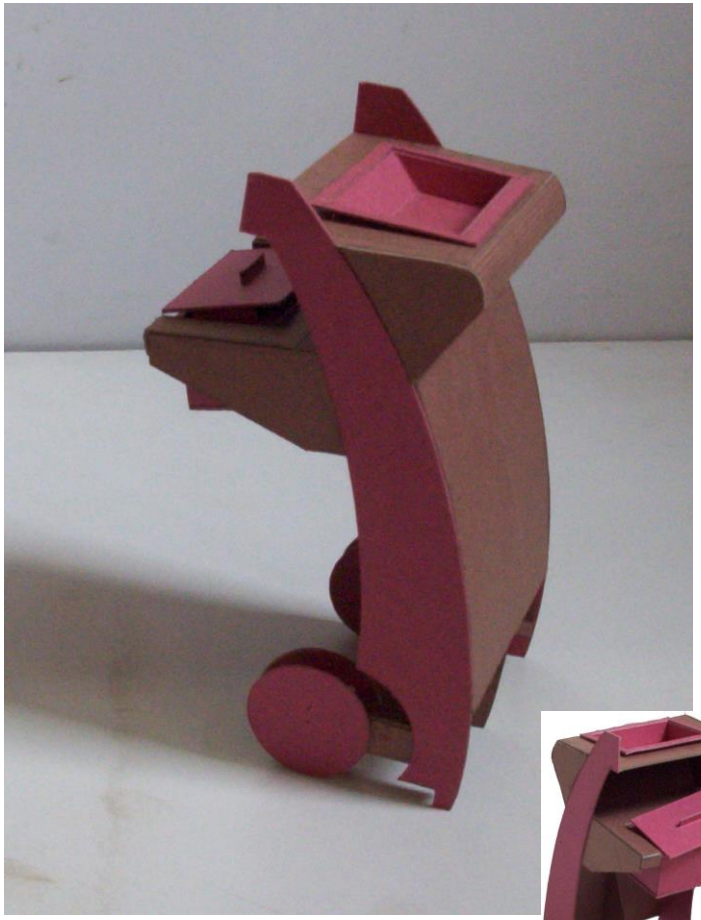


Function





Concept 1



This product concept features;

A trolley table with provision of chafing dish and also bulk storage incorporated without the canopies.

The chafing dish cavity itself acts as a module for incorporating various menus and utilities like holding dish.

Modular food display and service panels for incorporating existing chafing dishes and other serving utensils for different types of food.

The bulk vessel kept very close to the service vessel for easy refilling of the food.

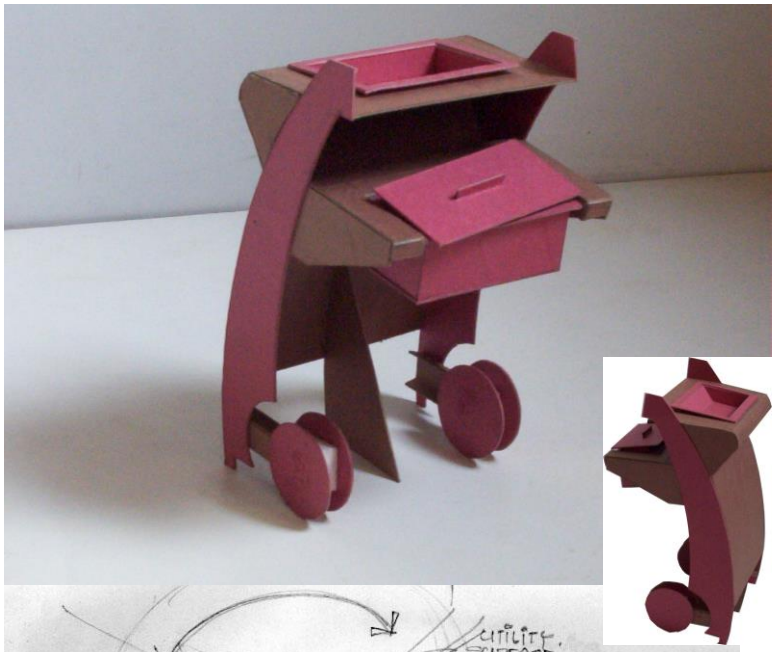
Sub-counter below the main food counter incorporating the bulk vessel for access to the fuel vessel below the chafing dish and also cats as service counter to keep the main table top uncluttered.

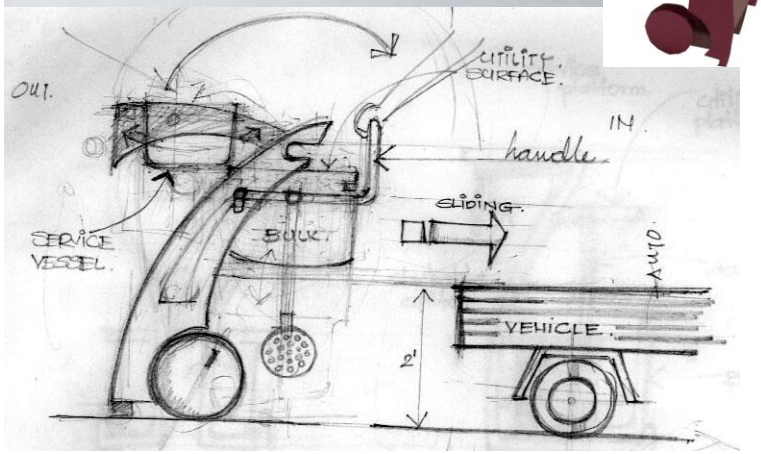
Multiple units can be lined along for depending on the menu.

The whole assembly is placed on the wheels for ease of independent transportation.

Gives a clean uncluttered look with the essence of sophistication.

The bulk store vessel is hinged ,so that while moving around, the vessel stays in horizontal position, and it also slides out for separately loading into the trolley.





Advantages

Essentially SS frame and SS sheet metal, with SS chafing vessels. To avoid the canteen equipment, look, the SS infront panel, can be powder coated in different colours.

Dis-advantages

Too many units required for every food category.

Can the new look appeal compared to the conventional look.

Should not look like canteen equipment.

Heating required for the service counter.

No enclosed storage.

Unleveled ground

Taller visual element required.

Cost

Advantages

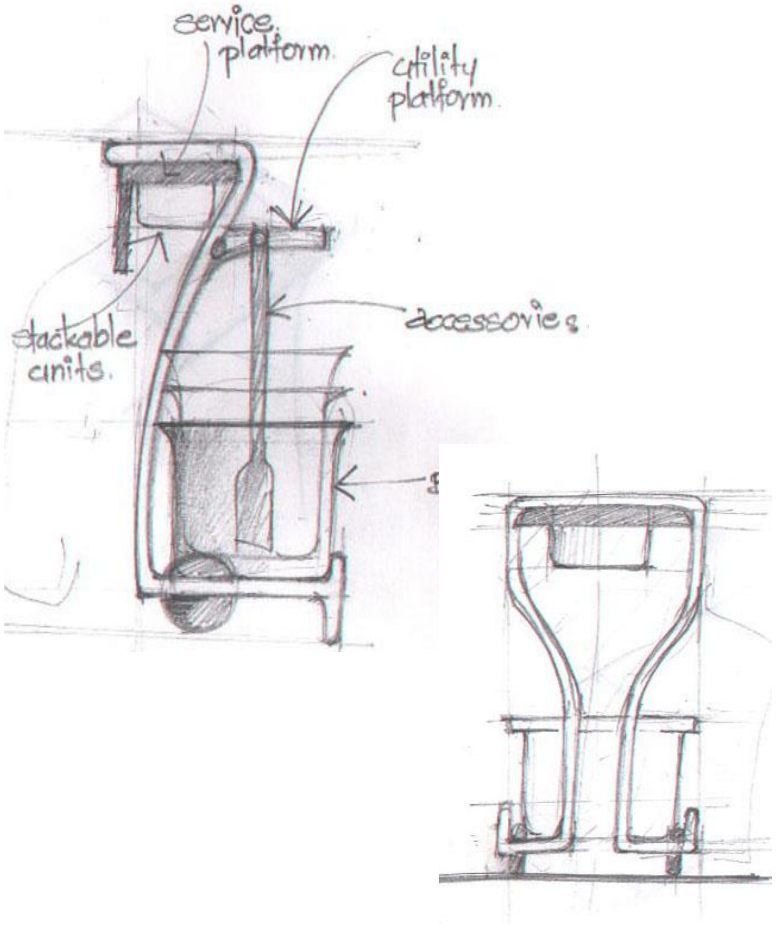
Modular, so can be lined and modified according to the Menu.

The lid of the bulk only acts as a utility counter below.

Removable bulk vessel for loading and unloading

Mobility

Hinged container for unleveled ground



Concept 2

Advantages

Based on very similar lines as concept , but acts as a cost cut down alternative to concept !.

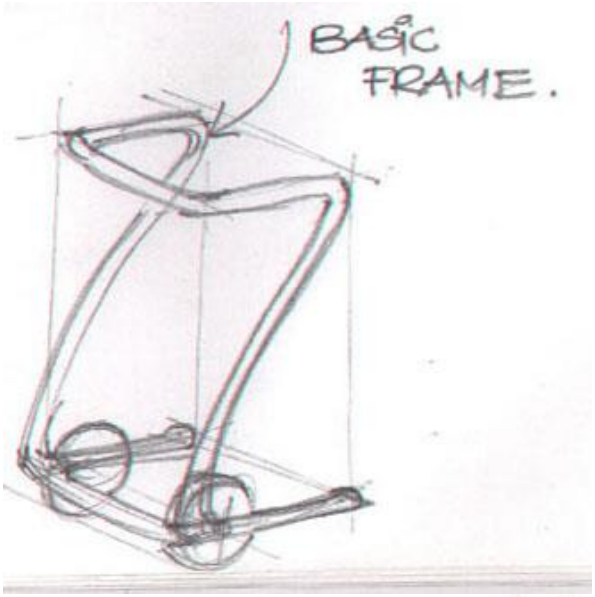
A main tubular SS frame is the skeleton which holds the chafing vessel and the bulk vessel.

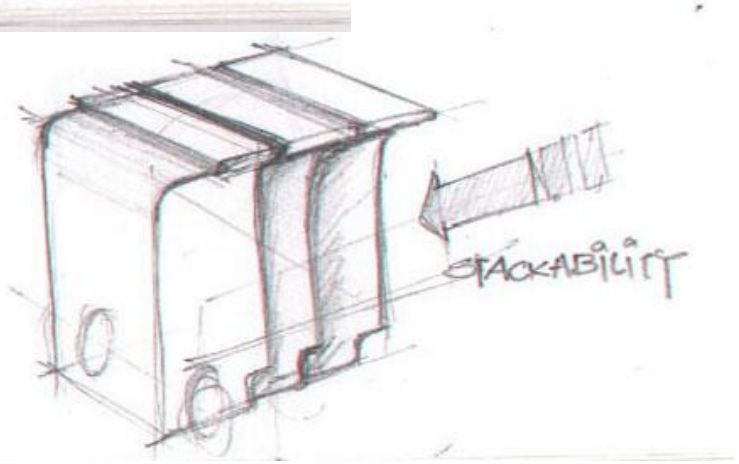
The bulk vessel is held at the bottom.

There are two platforms, main platform counter and service Counter.

The equipment can be removed and the frame is stackable.

Very functional and low cost, but lacks totally in aesthetics.





Advantages

Food transfer handled well.

Stacking

Used also as utility counter behind the main counter.

Ease of cleaning and hygienic.

Mobility

Dis-advantages

Too many units required or can be used for core food only.

Very simplistic look, due to exposure of basic frame.

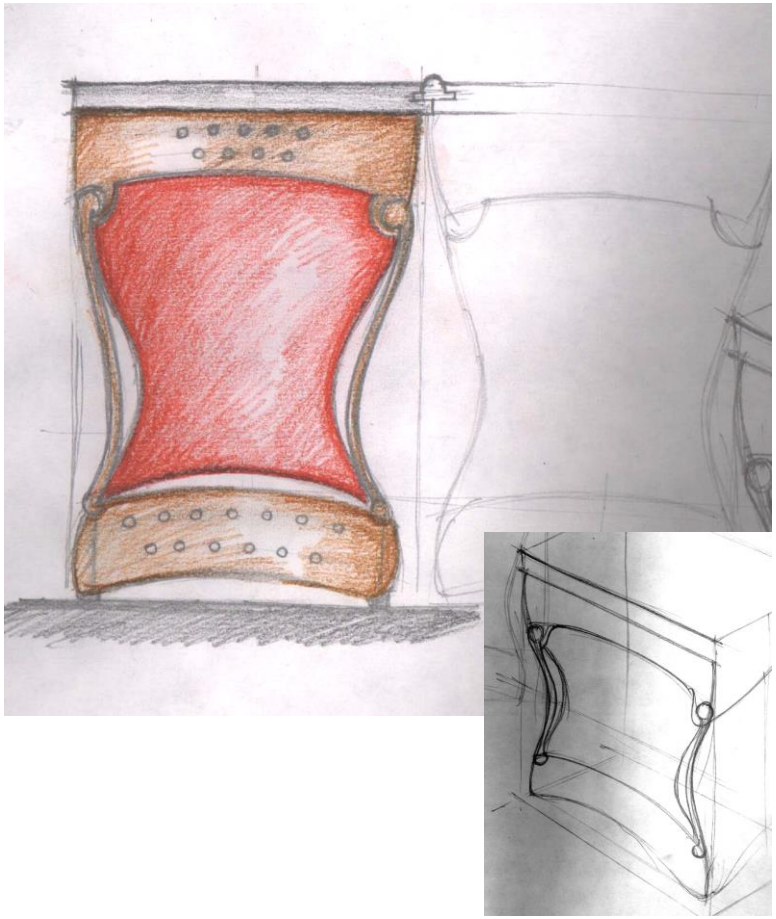
Wheels to be made Inconspicuous.

Heating required

Stability

Storage close to ground not required .

Taller visual element.



Concept 3

Features

Cloth stretched as front panel

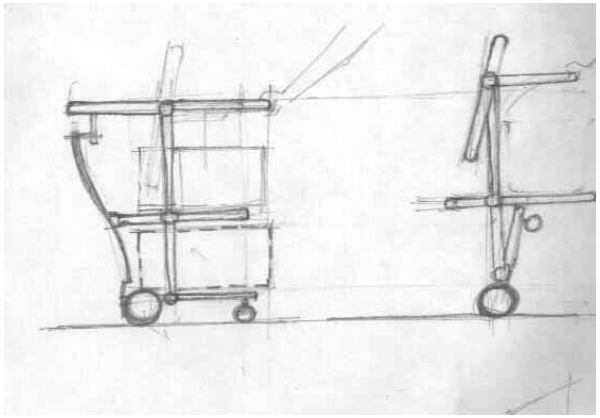
Form breaks the rigidity

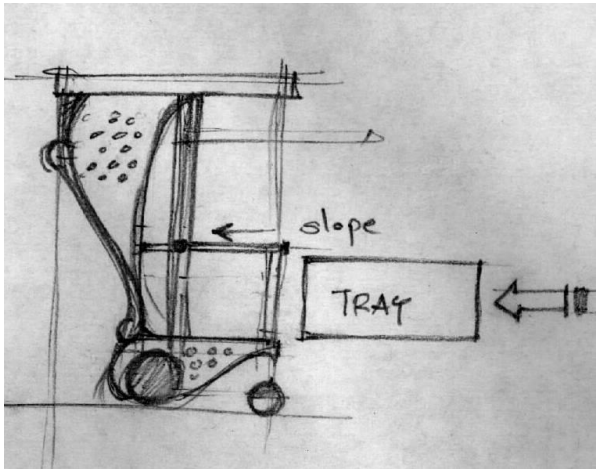
More celebrative look

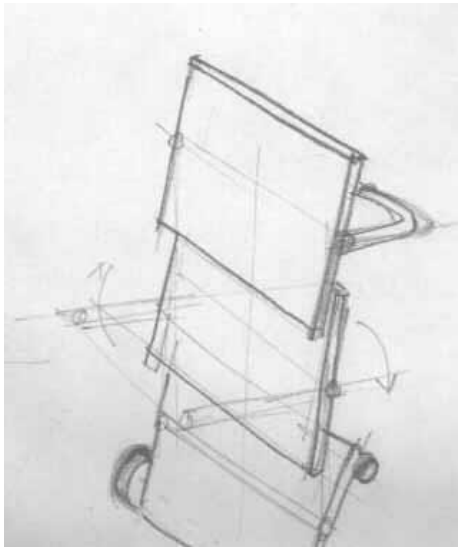
Stacking of 1 plastic tray
Size 26"x18"x12.5"

Front top and lower panels
With brass colour finish

Can be dismantled, folded
and stacked







The concept is based on local mobility for the counter also

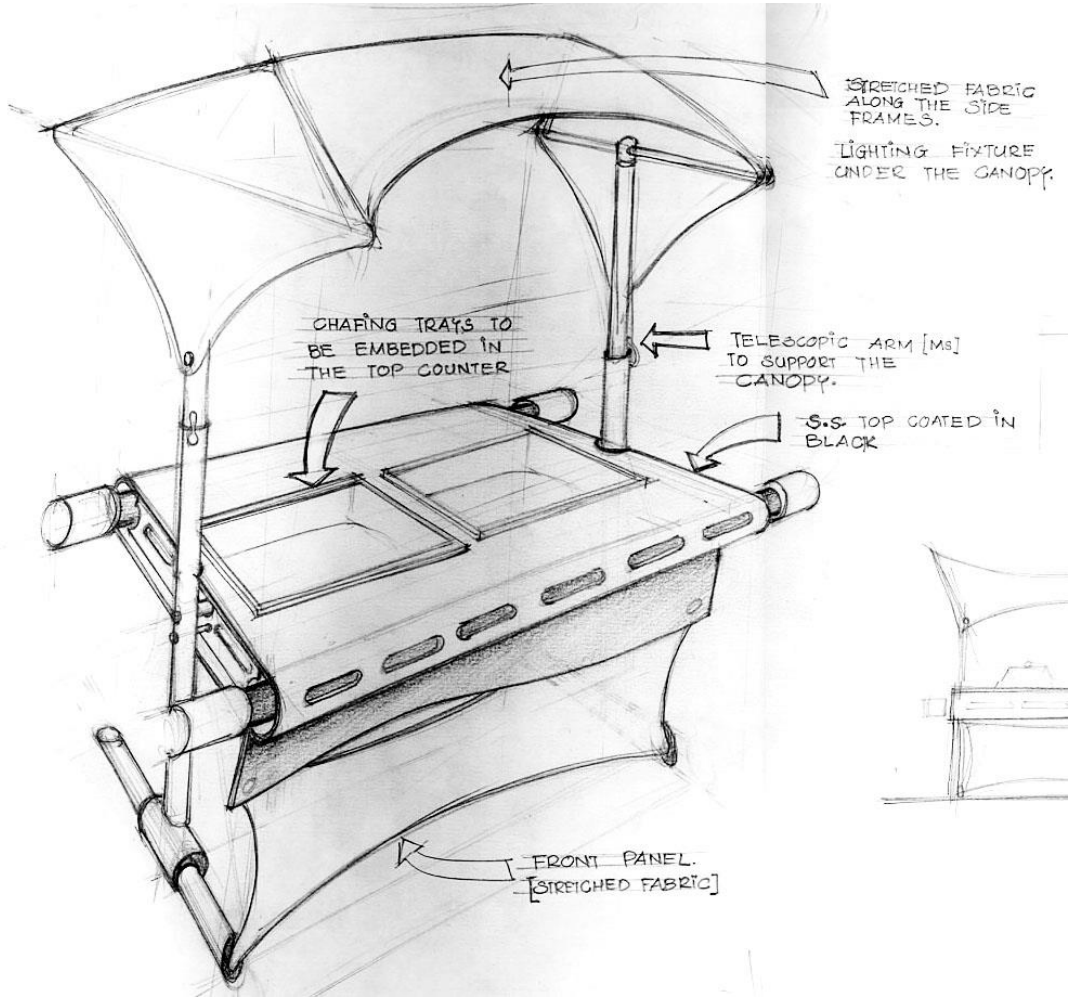
Consideration for the storage is among the main factors

Keeping in mind stack ability of the unit is emphasized in the design

Materials:
For the top, bent sheet metal is advised preferably SS

The frame could be made of steel or aluminum or SS

Rotating castors at the back end for better maneuverability.



Concept 4

The features of the concept are;

A totally knockdown table with attachments of fabric for the canopy, the front and the side panels.

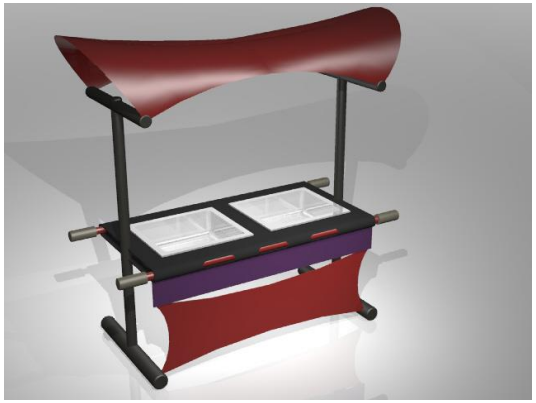
Modular food display and service panels for incorporating two existing chafing dishes.

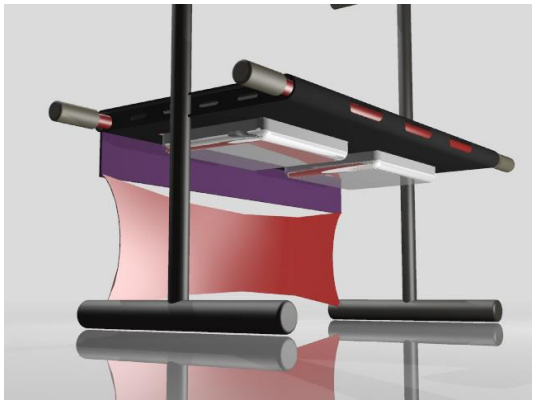
A cartridge system for replacing empty chafing dishes and space below the table utilized for storage. Cartridge so that the unhealthy site of filling up in the front of the guests is ruled out.

SS top are more suitable to bear rough handling and being resistant to rusting.

Proposal of a rear working platform for other preparatory activities.

Canopy over the food counter, to protect during outdoors also holds the lighting to give ambient lighting through the translucent fabric.





Telescopic arms to adjust the canopy height.

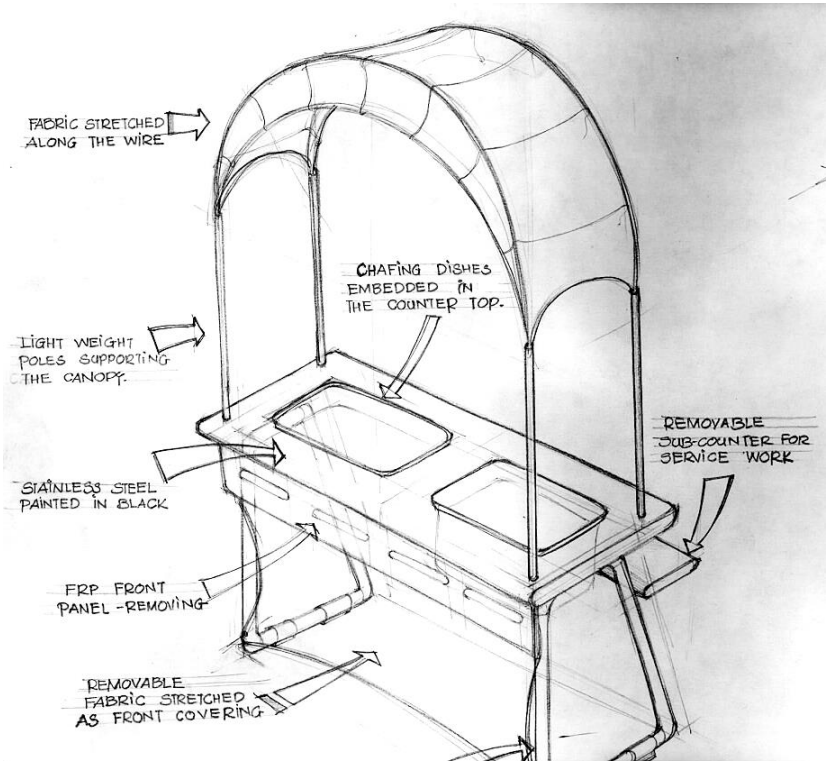
Wedge shape in plan to form various convex and concave arrangement of the counters.

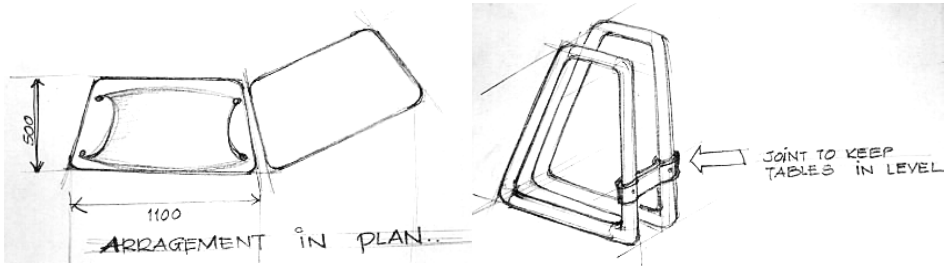
Table top fixed into the two side poles and can be dismantled.

Table top incorporates two standard size chafing dishes.

To add an element, two pipes are as if passed through the counter to show, the connection of subsequent counters and also colourful elements.

Fabric stretched in the front, which can be changed depending on the occasion.





Concept 5

The concept is developed keeping in mind the simplicity of the product which can be achieved through the the simple structural system.

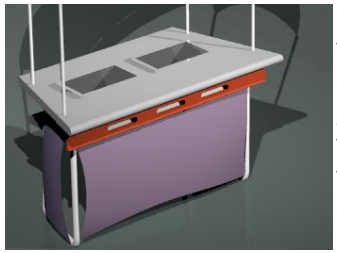
The concept is developed also keeping in mind background or the setup I.e. outdoor context.

It is designed for quick assembly on site by reduction in number of components to be assembled on site.

Use of light material so as to ease the transportation of numerous units.

Also the overall design is made so as to be able to transport in a small vehicle.

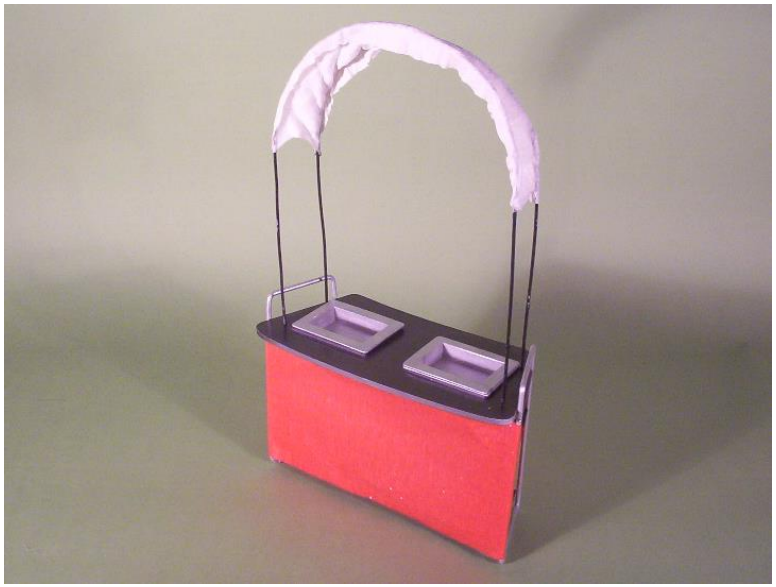
Avoiding joinery through mechanisms was kept in mind, so as to make the structure support Itself.



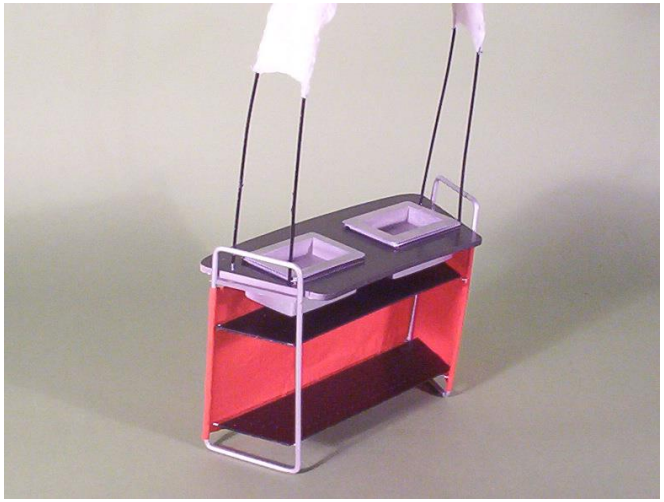
Two number of chafing dishes are incorporated in a single unit for the reasons as;

Lining up various units to give various formations when lined along.
Depending on the menu, the chafing dish numbers is two.
To fit into the transportation medium, like an autorikshaw.

The features include;
Two legs which form the frame of the table.
A pipe which forms legs of the table.
Both the legs fold inside to make it flat for transportation.
The legs are attached to the top by a pivot (see next page)
The legs fold along the pivot inwards and a storage rack at the bottom hold them in position from folding inwards.
Existing chafing dishes have been incorporated into the table top.
The canopy is held with the help of four columns through which a wire is passed to support the canopy.
The four columns are inserted inside the table Top to make them stand with the help of screws at the bottom.

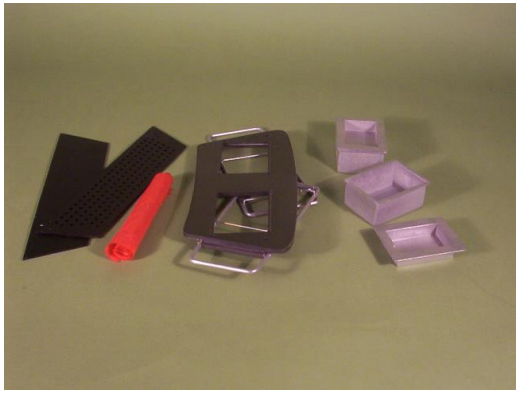


The physical model of concept 5 from the front.
The fabric stretches along the front and the sides.
The fabric is fixed with the simple insertion joints.
The legs extend above to give a tray like look.



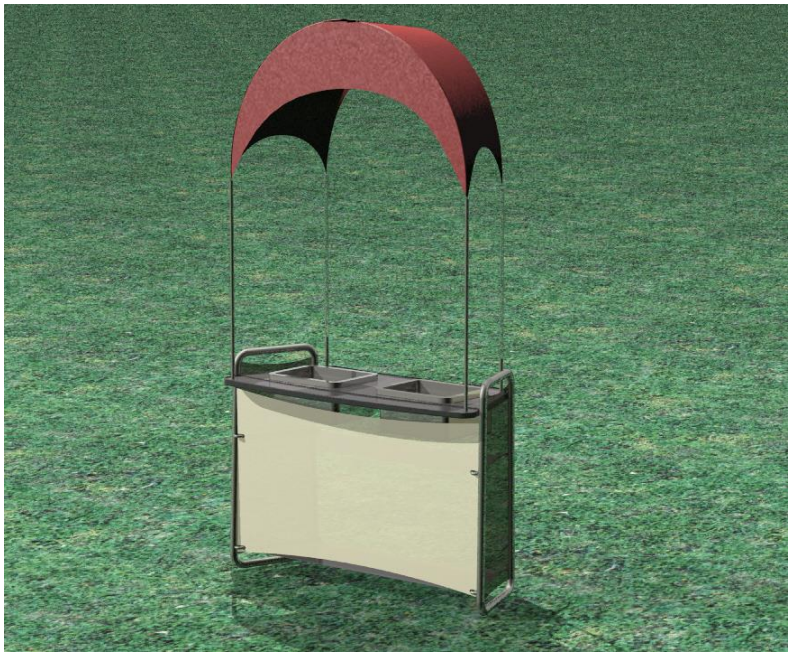
The racks kept below the chafing dishes for storage.
The upper rack to hold the burners and spoons for service.
The lower rack of perforated sheet which also acts as a member to hold the legs in position.

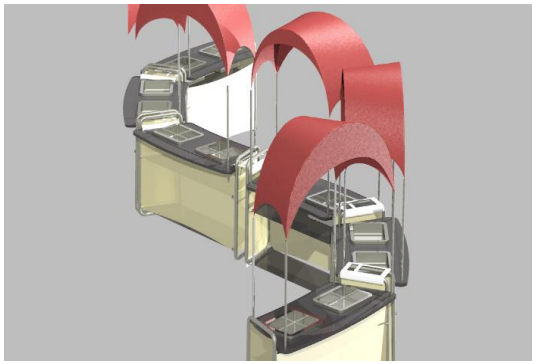
The main structural system of the table.
The top made of fiber board and the lower rack perforated sheet, and the legs or the frame of SS.



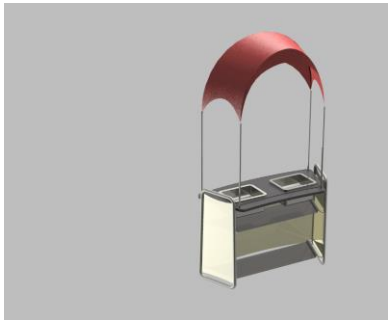
Number of parts as compared to the existing table assembly is drastically reduced.

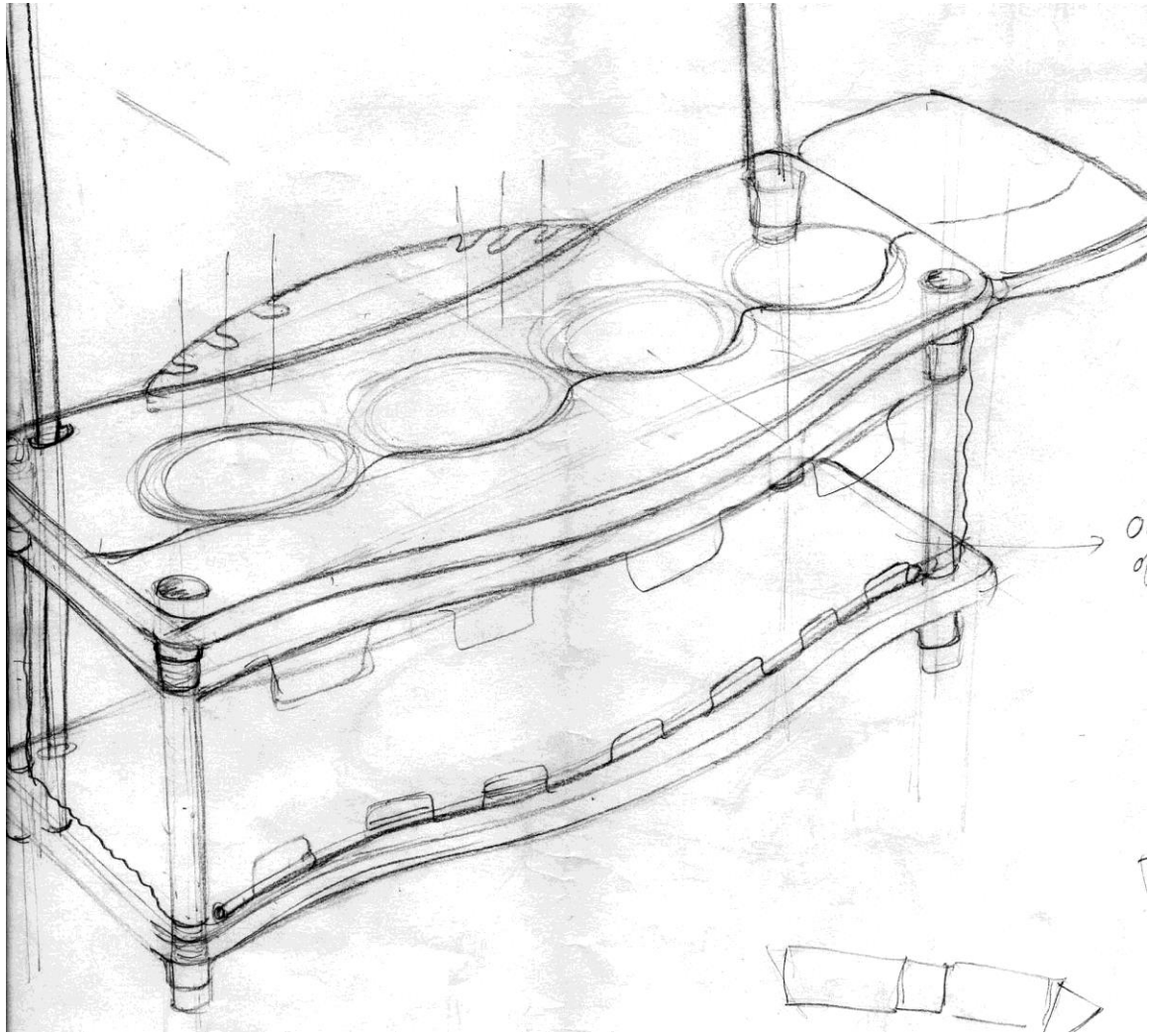
Without the canopy





Formations because of the wedge shape.





Concept 6

The main components are the top and the bottom.

The top is interchangeable with the bottom which gives the option of a flat top also.

All the legs are independently fixed on to the top and the bottom.

The canopy is held with the help of two Columns which pass through the height of the table.

The fabric in the front is attached with the help of Velcro and hung down.

Number of tables when lined along will] be attached to each other with the intermediate panels.

Evaluation of concepts

In totality, the product gives various directions to explore in interesting ways. The concepts are visualized in a product form which can relate to the surrounding environment and the ambience. They have to respond, and be versatile.

Alternatives such as knockdown with stackability as a means of transportation have been explored. The product is a part of a whole system of equipment required, so only a proposal for the working system is put forward.

The concepts have evolved exclusively to be food counters for transportation.

Concept 1

The form of the concept is interesting, but it succeeds in achieving a visual monotony of form and obviousness.
Without the canopy, the product fails to make a semantic statement of a food counter.
A very standard chafing vessel proposal, which fails to incorporate the variety of menu.
A not cost effective alternative to the existing tables.
Although the use of linear and cloth/rexin is eliminated, the product fails to give a festive look to the environment.

Concept 2
A very basic exploration in terms of the function.
The product gives a very crude feel as a food counter.

Concept 3
The concept is very close in achieving a festive look to the environment.
Again due to lack of canopy, it lacks to achieve the look.
The concept cannot be cost effective solution to the existing equipment.
Different design of chafing dish does not necessarily adapt the look of the trolley.
Good stack ability achieved, but is effective only with the use of light weight material.

Concept 4

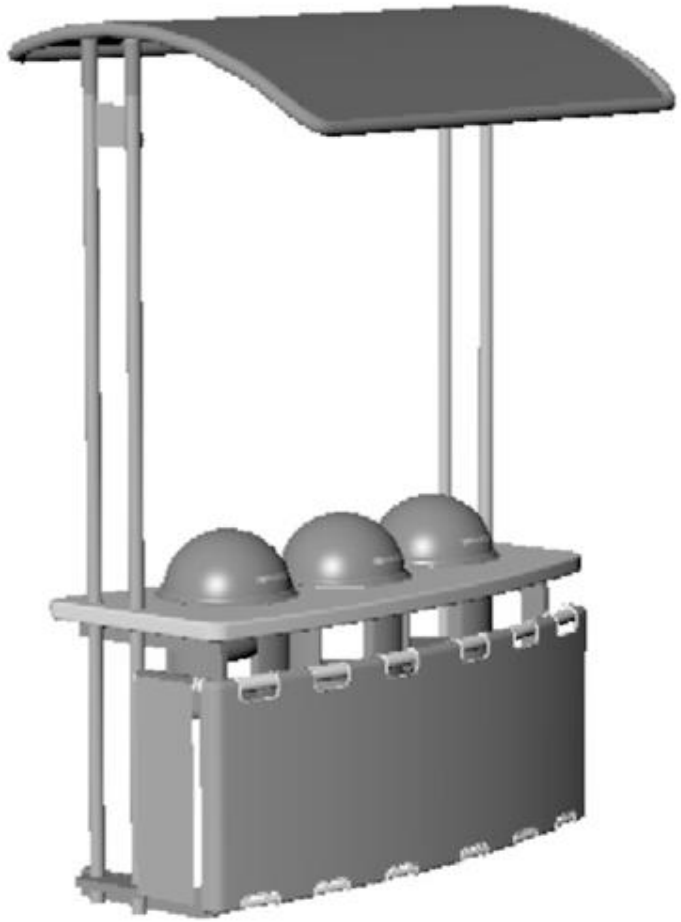
The form of the counter looks very interesting, especially with the stretched canopy at the top.
The top of the counter does not offer the flexibility of use as a plain table.
The members though very less in number, have thicker or heavier
To support the table.

Concept 5

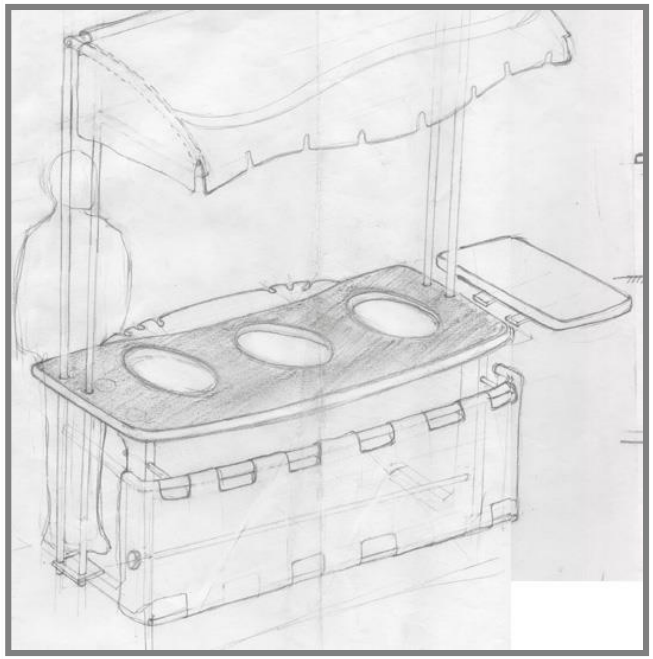
A very practical solution but fails to give an appealing look to the .product
The folding legs over top of each other do not form an ideal situation for stacking.
The fabric can sag due to the kind of joinery and not give a pleasant look due to the gaps.
The canopy needs a firm support which can be achieved by inserting it more deep into the table top.
The base rack needs to be fixed firmly to the frames.

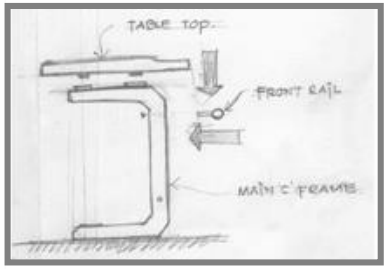
Concept 6

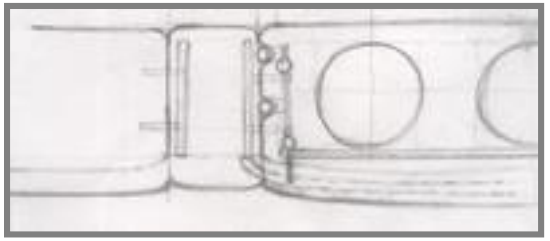
Here the number of parts is not reduced but increased, though the concept offers a great flexibility. Stacking and storage is an advantage, but the product fails to justify in terms of number of parts.



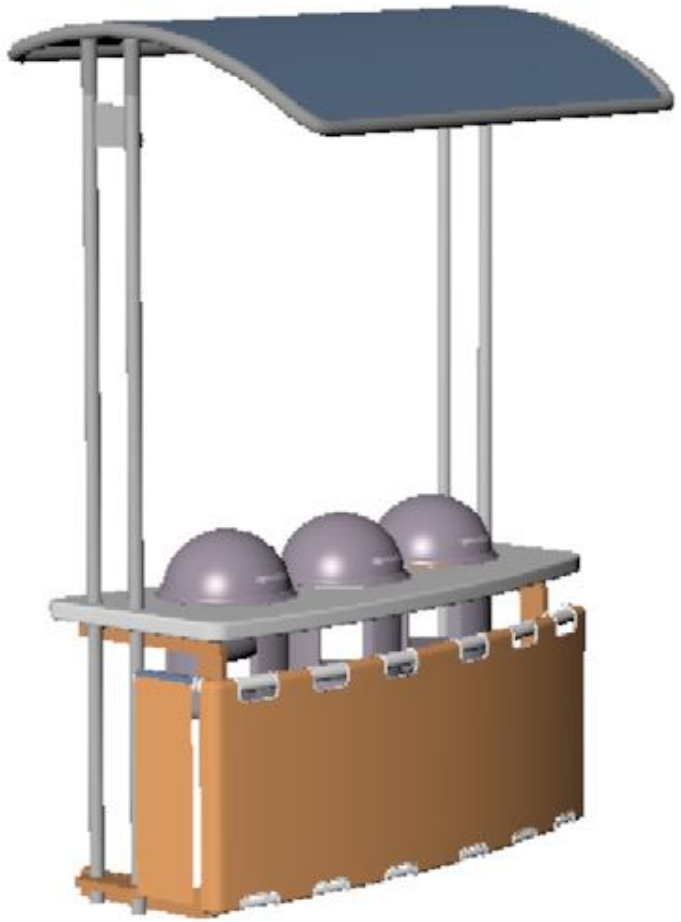
Final Concept







Features



Some of the important features which have been attempted are;

Attempt achieve a very light look to the structure
The members from the skeleton of the unit, narrowly Spaced members supporting the roof, which make it look light.

Tried to achieve a structure of temporary structure
With the cloth stretched with the weights, and the structure as a whole gives a very temporary setup feel.

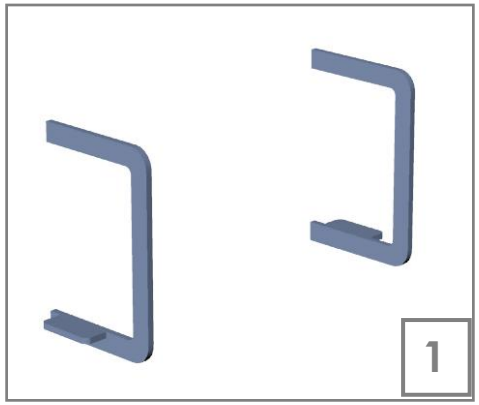
The structure itself acts as a support to make it rigid
The two C frames connect with the tie rod, and the table top. The two columns just slide in the holes and the canopy caps on to the columns with the acrylic sheet sliding in.

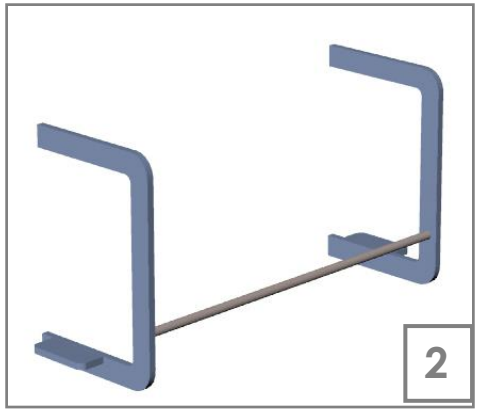
Not totally enclosed – chafing burners can be seen
There is a gap maintained between the table top and the front covering cloth for the burners to be seen from the front side.

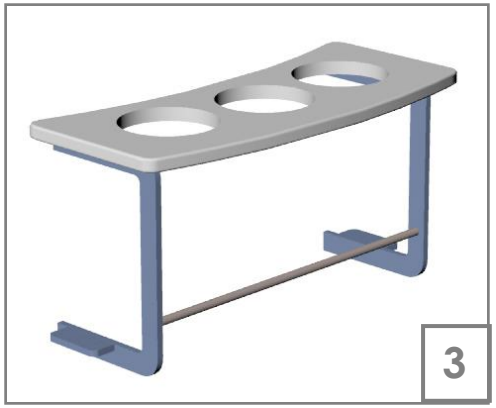
Modularity with the help of intermediate members
Intermediate plates ensure the modularity …refer images.

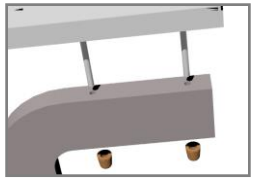
Structure
The top supported on two c frames
Front suspended from the c frames
Canopy is free standing, supported by the top
And the c frames

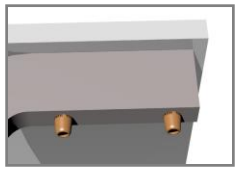
Assembly sequence



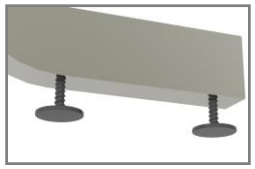








Detail



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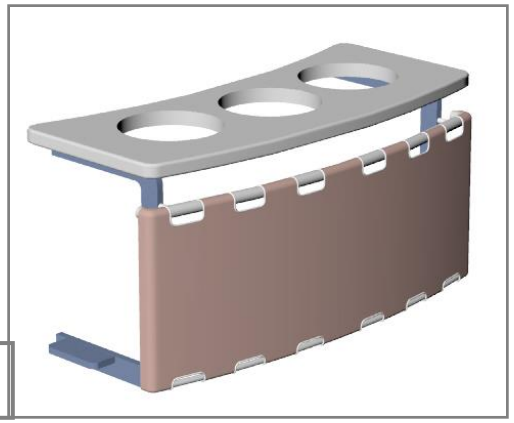
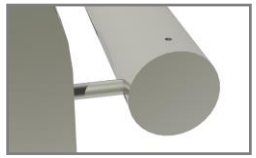
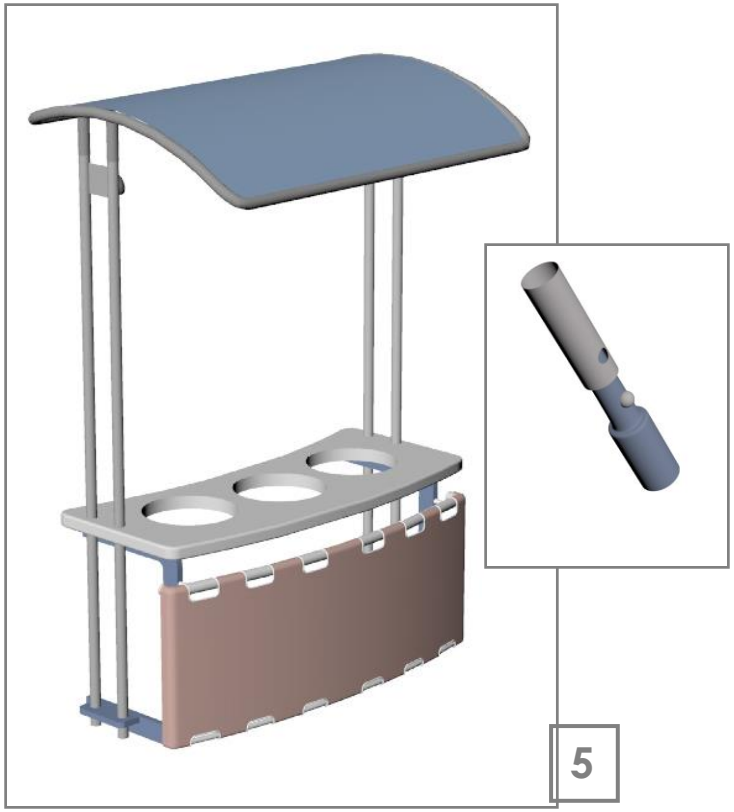




Detail



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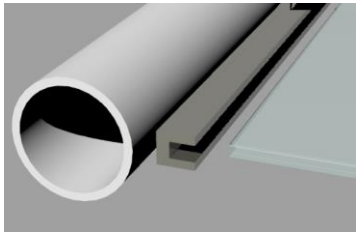

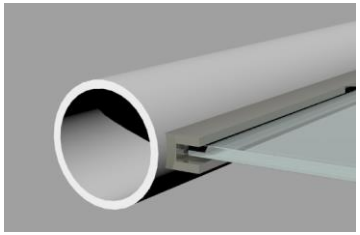

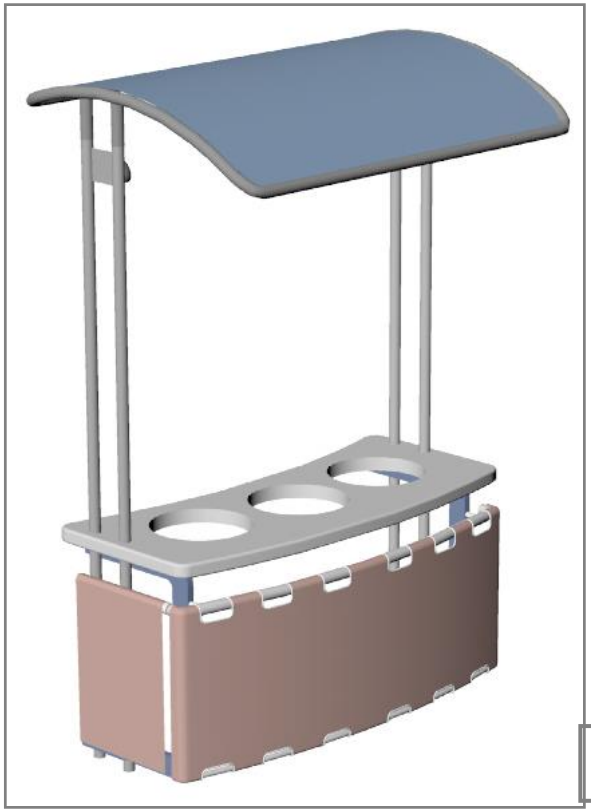

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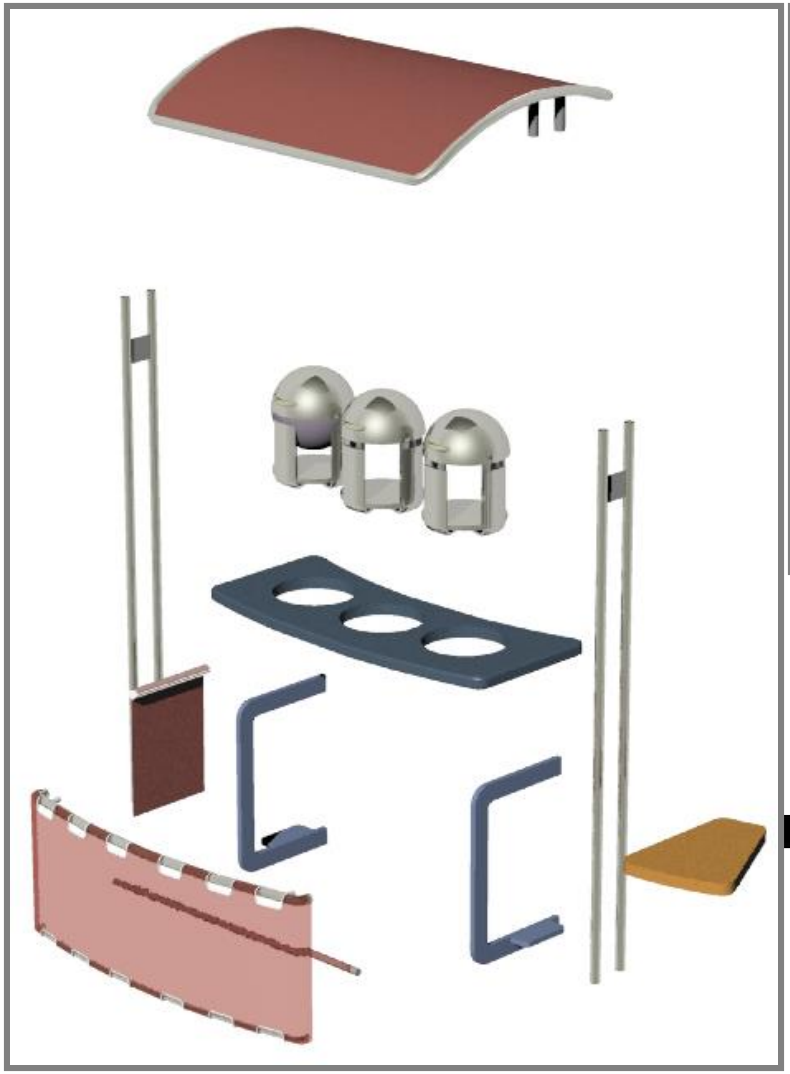
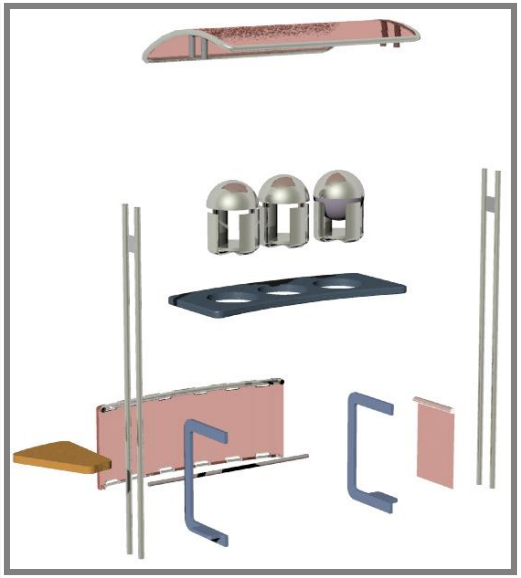
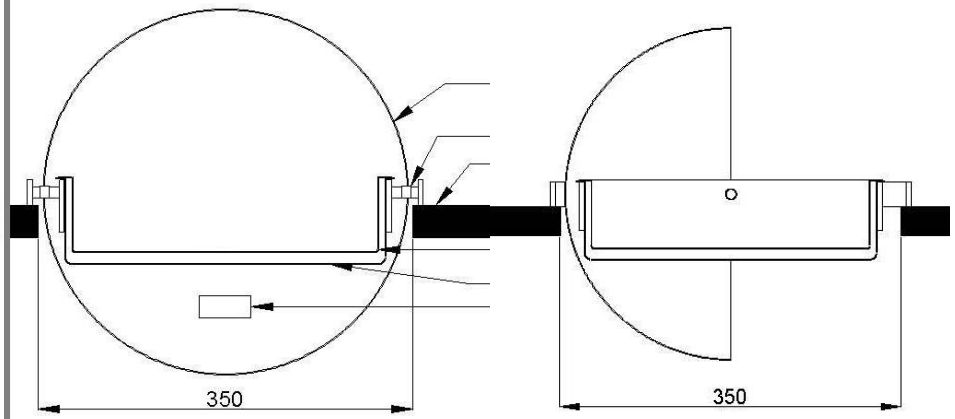
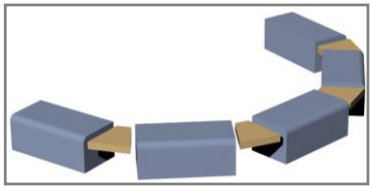
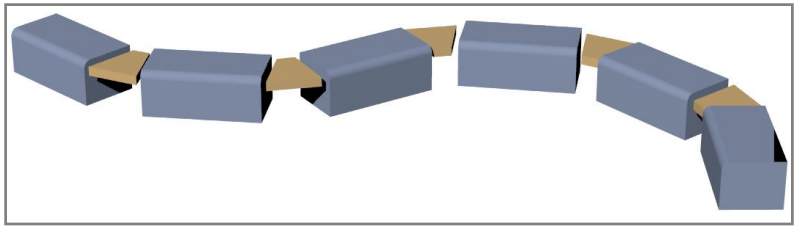


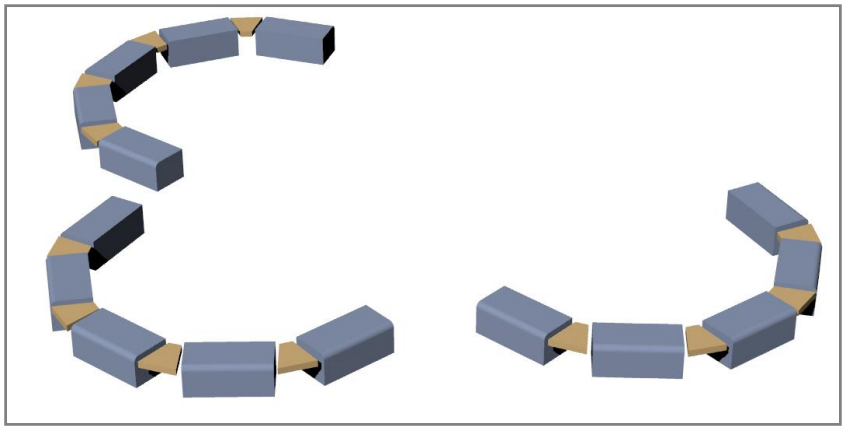


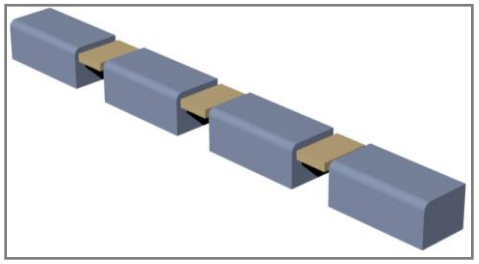


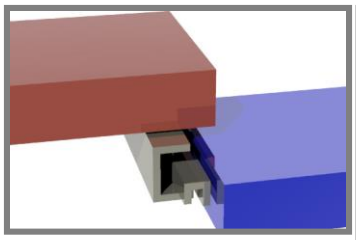
Exploded View

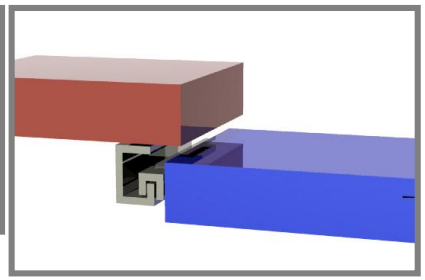












Detail for side panels

Material

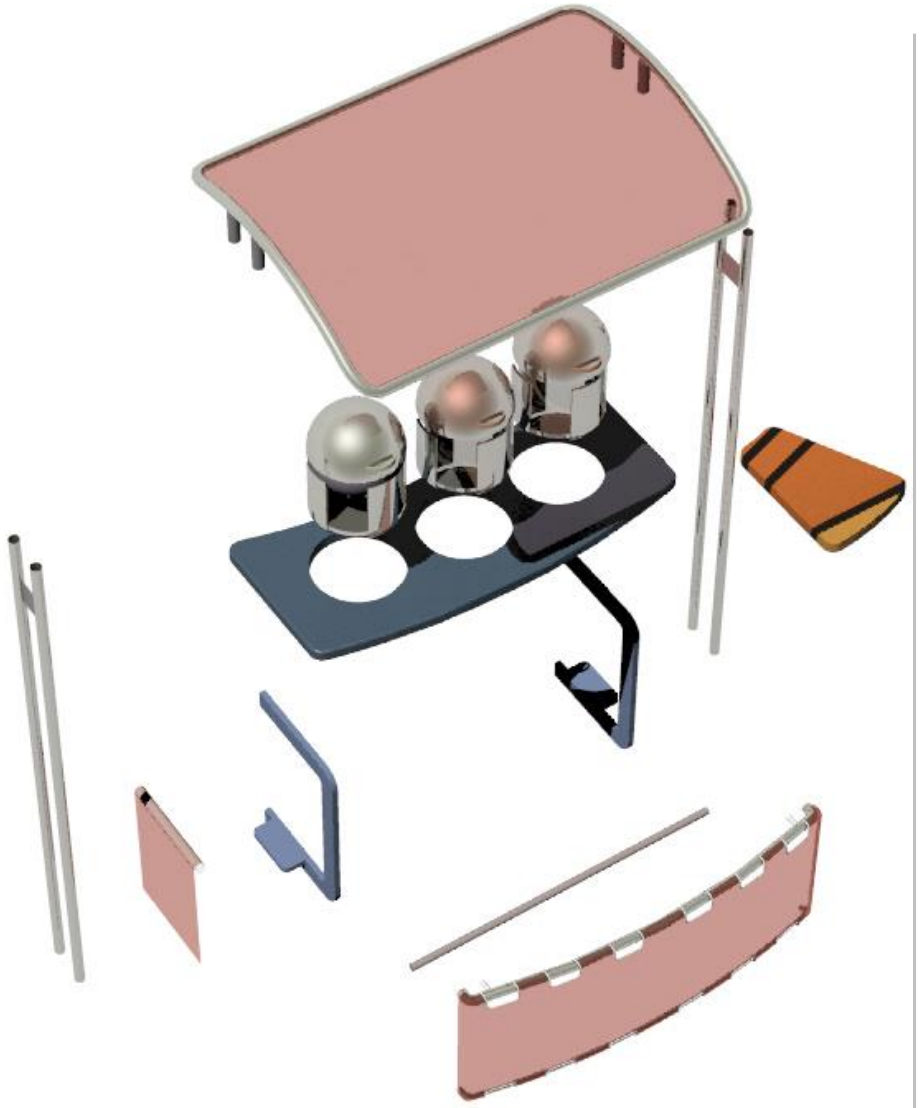
Top surface: The table top is made up of Fiber Reinforced Plastic sandwiching Foam or Thermacol Manufacturing is done in two halfs and joining

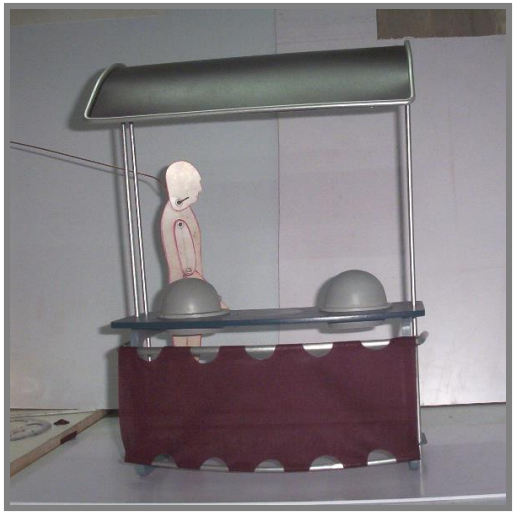
C frames: The C Frames are both Box sections in SS with a brush finish to withstand rough handling.

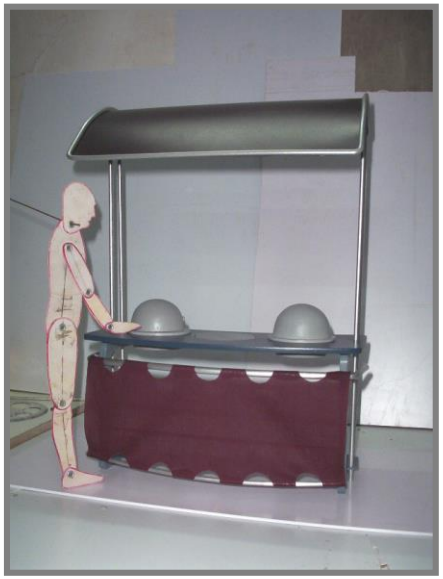
Structural pipes: All the structural Pipes are recommended to be used as Stainless Steel again in brush finish

Canopy : Canopy is an acrylic sheet which can be changed according to the requirement of the occasion.

Fabric: The Fabric used to cover the front and the sides can be the usual commercially used material.

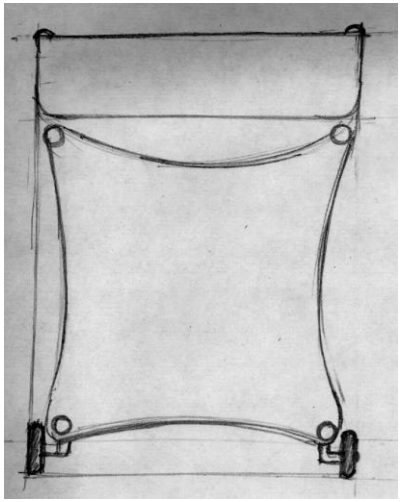


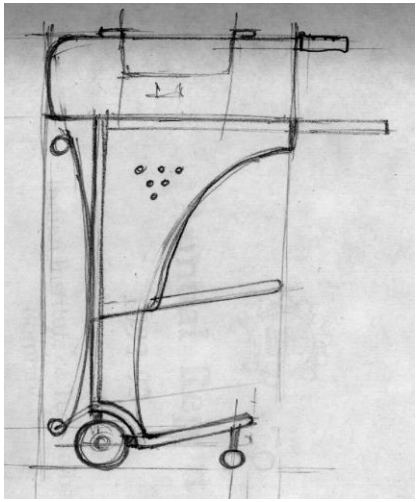


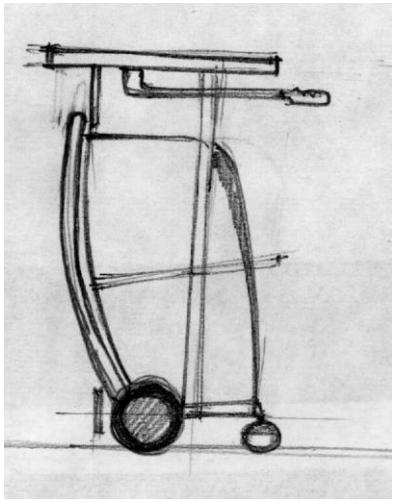


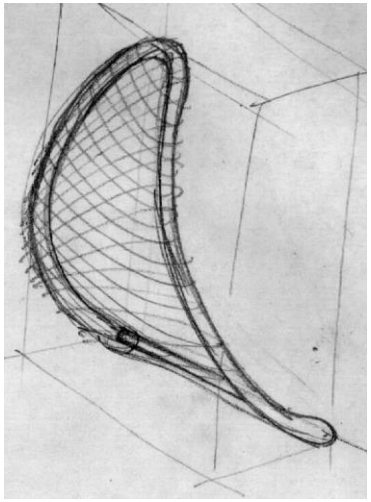
Model with Human Dimensions 50th Percentile

Photograph of the Model

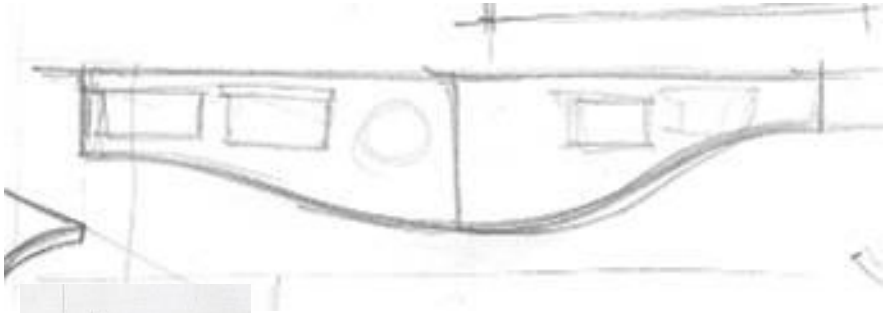


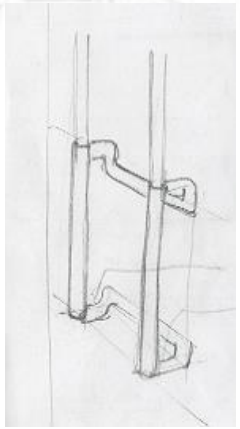


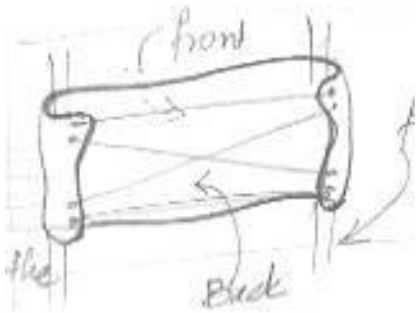


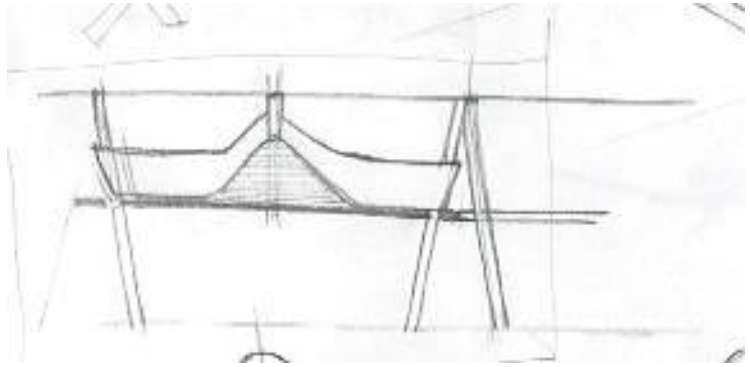


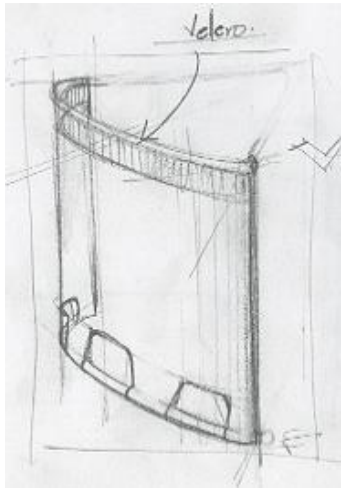
Other explorations

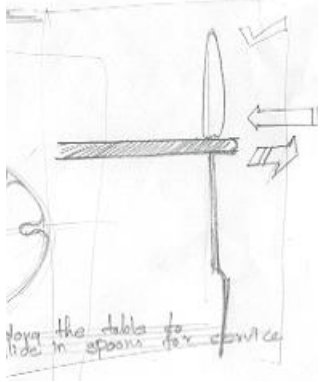


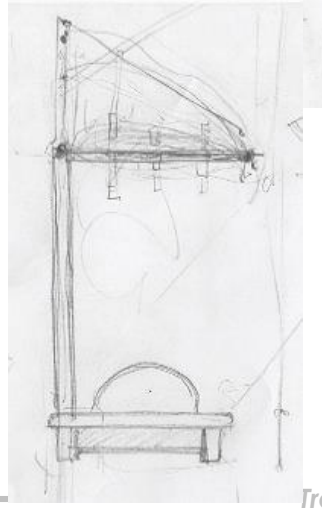


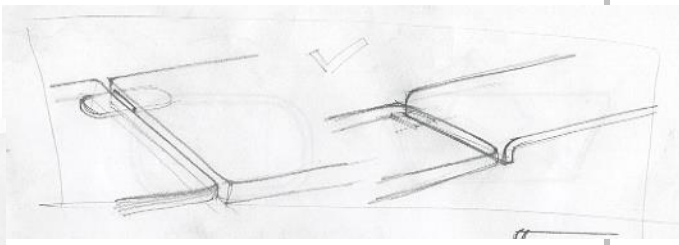

front
Back




velcro


along the table to
slide in spoons for service





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equipment……IDC project 1997
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plan……M C Grawhill….IDC library
Kitchen Book……Cowran, Terence…IDC library.
High tech……Joan Kran & Suzanne Slesin…IDC library
Innovation……IDSA (1994) Central library.

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www.galasource.com
www.google.co.in
www.mrao.cam.ac.uk
www.twinsupply.com

Some similar products

lot Food Station

Each well supplied with 525-watt element with infinite setting controls

High density glass fiber insulation

Spillage pans required - sold separately

Infinite control switches

Evening Dust Shown

Midnight Dust Shown

SCRIPTION	DIMENSIONS LENGTH: IN (CM)	HEIGHT: IN (CM)	BLACK	WALNUT WOODGRAIN	EVENING DUST	PEWTER	CHERRY WOODGRAIN	GRAY	WHITE	MIDNIGHT DUST
ELL HOT FOOD STATION										
ed base	46 (117)	35 (89)	38707	38935	38727	38747	38767	38787	38807	38827
ed w/lights	46 (117)	35 (89)	38707-46	38935-46	38727-46	38747-46	38767-46	38787-46	38807-46	38827-46
en storage	46 (117)	35 (89)	38708	38936	38728	38748	38768	38788	38808	38828
en w/lights	46 (117)	35 (89)	38708-46	38936-46	38728-46	38748-46	38768-46	38788-46	38808-46	38828-46
orage w/door	46 (117)	35 (89)	38709	38937	38729	38749	38769	38789	38809	38829
w/door, w/lights	46 (117)	35 (89)	38709-46	38937-46	38729-46	38749-46	38769-46	38789-46	38809-46	38829-46
ELL HOT FOOD STATION										
ed base	60 (152)	35 (89)	38710	38945	38730	38750	38770	38790	38810	38830
ed w/lights	60 (152)	35 (89)	38710-60	38945-60	38730-60	38750-60	38770-60	38790-60	38810-60	38830-60
en storage	60 (152)	35 (89)	38711	38946	38751	38751	38771	38791	38811	38831
en w/lights	60 (152)	35 (89)	38711-60	38946-60	38731-60	38751-60	38771-60	38791-60	38811-60	38831-60
orage w/door	60 (152)	35 (89)	38712	38947	38732	38752	38772	38792	38812	38832
w/door, w/lights	60 (152)	35 (89)	38712-60	38947-60	38732-60	38752-60	38772-60	38792-60	38812-60	38832-60

old Food Station

20 gauge 18-8 stainless steel work surface

Non-refrigerated 6" (15.2 cm) deep well

Foamed-in-place polyurethane foam insulation

1" (2.54 cm) drain makes cleanup easy

Pewter Shown

Cherry Woodgrain Shown

SCRIPTION	DIMENSIONS LENGTH: IN (CM)	HEIGHT: IN (CM)	BLACK	WALNUT WOODGRAIN	EVENING DUST	PEWTER	CHERRY WOODGRAIN	GRAY	WHITE	MIDNIGHT DUST
COLD FOOD STATION BASE										
ed base	46 (117)	35 (89)	38713	38950	38733	38753	38773	38793	38813	38833
ed w/lights	46 (117)	35 (89)	38713-46	38950-46	38733-46	38753-46	38773-46	38793-46	38813-46	38833-46
en storage	46 (117)	35 (89)	38714	38951	38734	38754	38774	38794	38814	38834
en w/lights	46 (117)	35 (89)	38714-46	38951-46	38734-46	38754-46	38774-46	38794-46	38814-46	38834-46
orage w/door	46 (117)	35 (89)	38715	38952	38735	38755	38775	38795	38815	38835
w/door, w/lights	46 (117)	35 (89)	38715-46	38952-46	38735-46	38755-46	38775-46	38795-46	38815-46	38835-46
COLD FOOD STATION BASE										
ed base	60 (152)	35 (89)	38716	38960	38736	38756	38776	38796	38816	38836
ed w/lights	60 (152)	35 (89)	38716-60	38960-60	38736-60	38756-60	38776-60	38796-60	38816-60	38836-60
en storage	60 (152)	35 (89)	38717	38961	38737	38757	38777	38797	38817	38837
en w/lights	60 (152)	35 (89)	38717-60	38961-60	38737-60	38757-60	38777-60	38797-60	38817-60	38837-60