Habitat: Mess

Group "**Full deck**"
PD203

Nishita Sree
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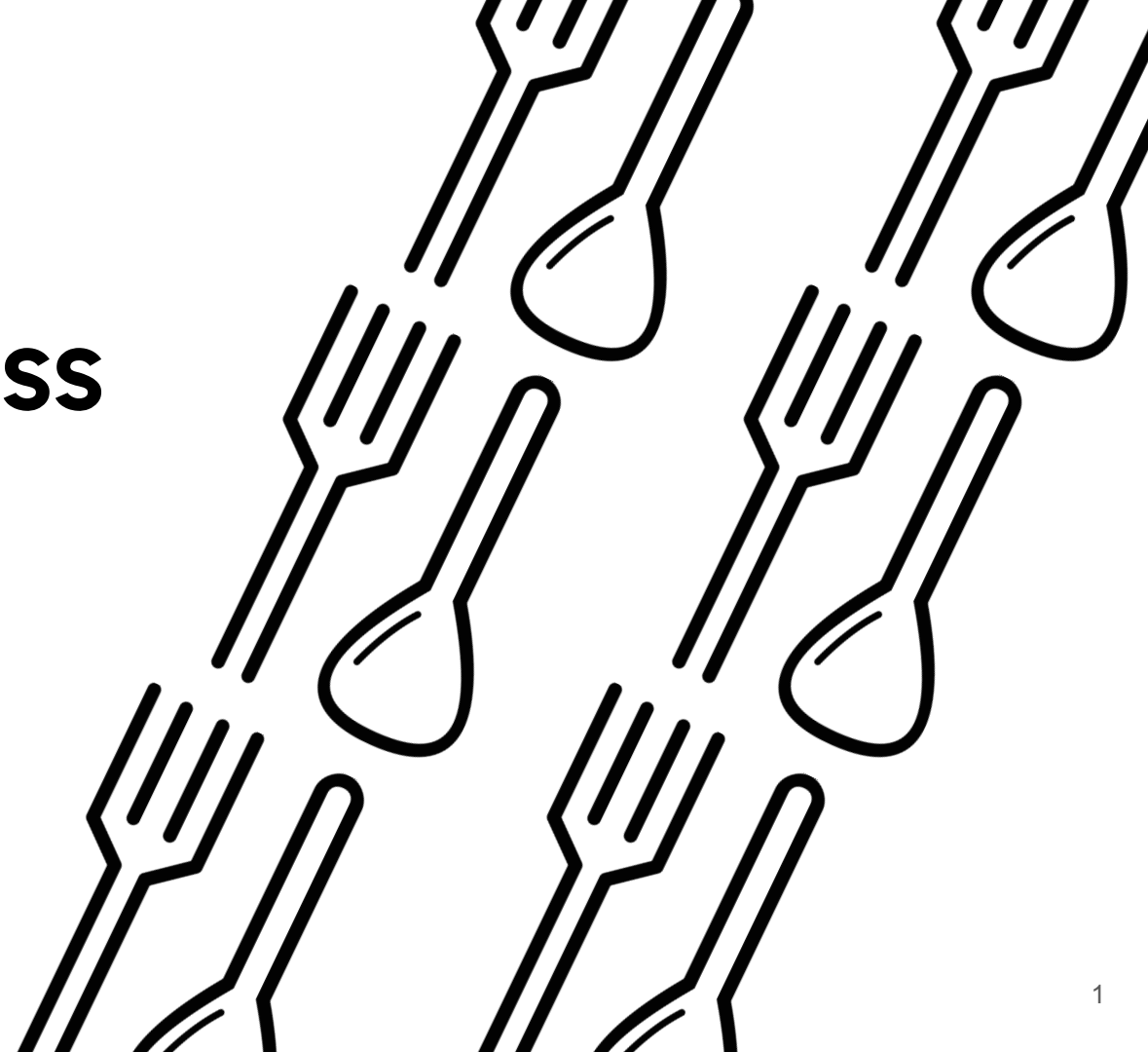


Contents

0 Recap
About the habitat

C Mess

950
Students

Breakfast
7:30 AM to 9:45 AM

Afternoon
12:30 PM to 2:00 PM

Snacks
4:30 PM to 6:00 PM

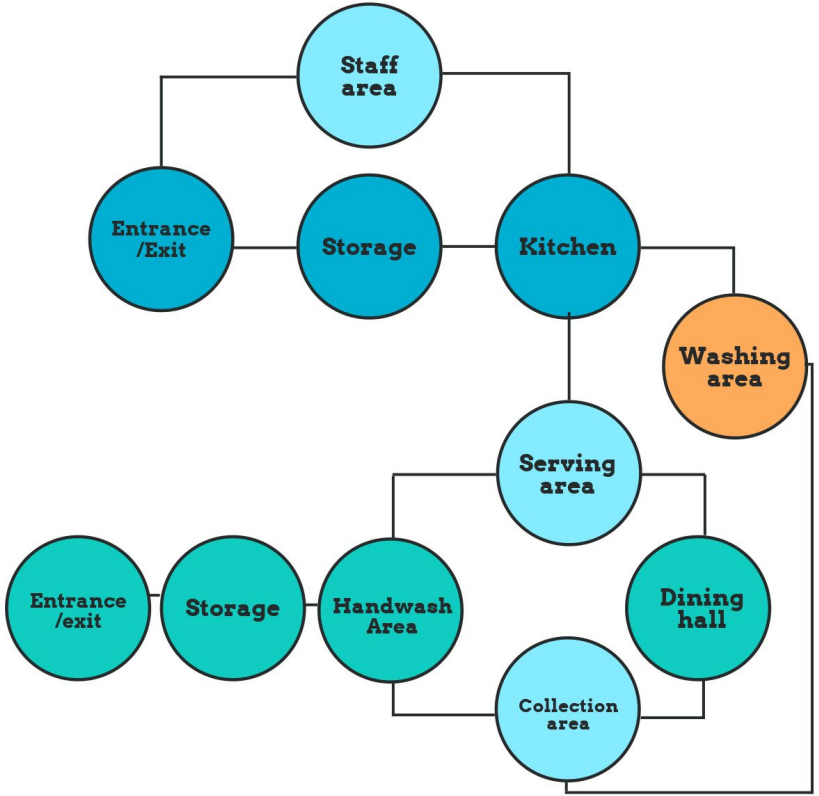
Dinner
7:30 PM to 9:00 PM

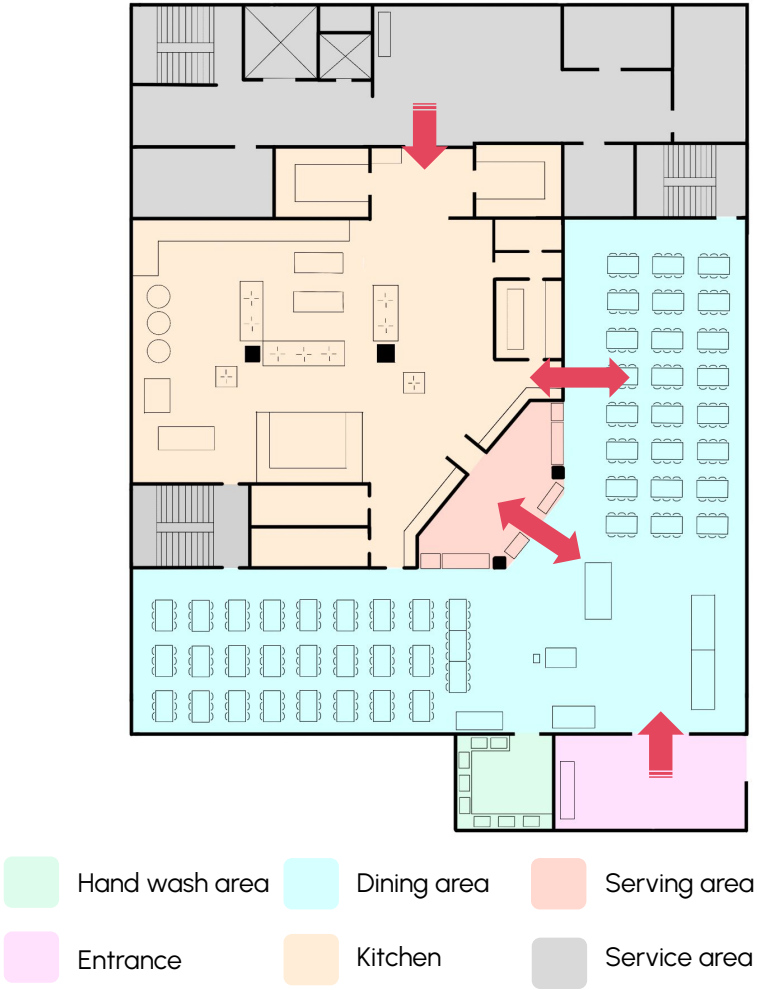
46
Staff

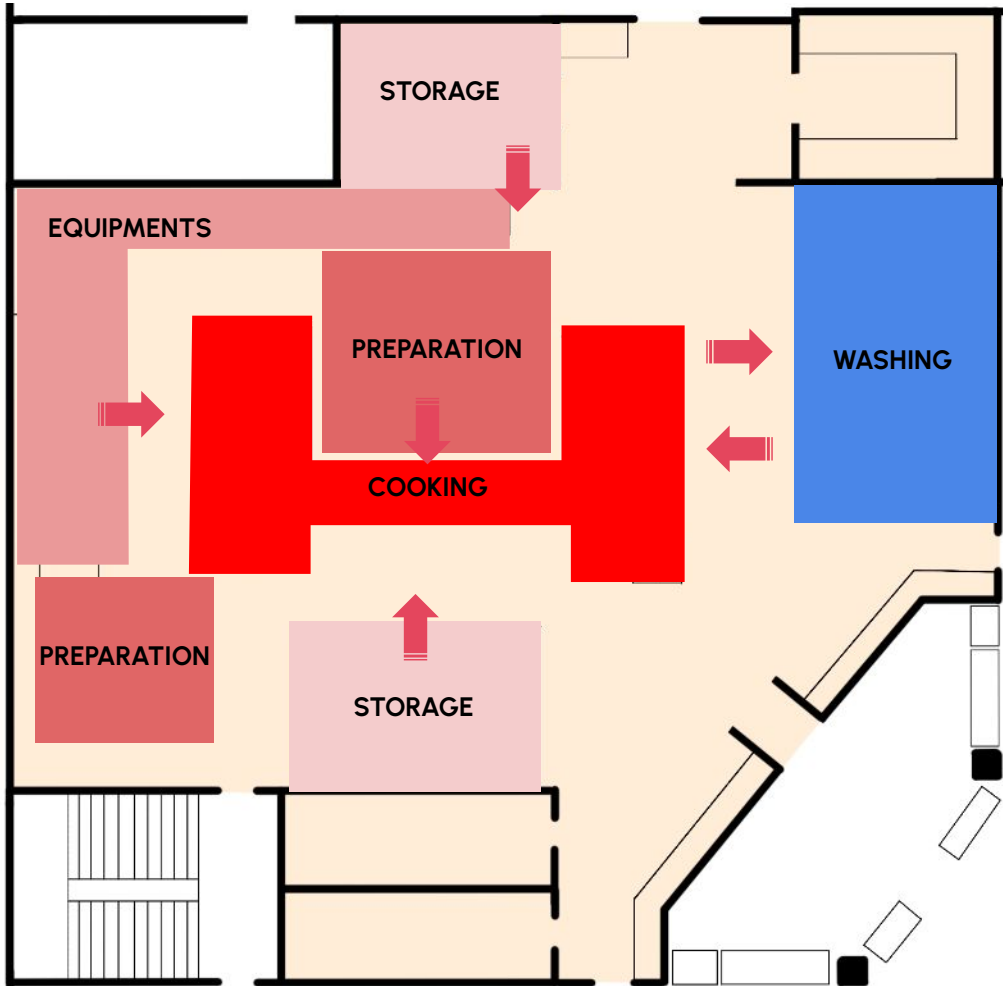
Morning
6:00 AM to 2:00 PM

Afternoon
2:00 PM to 9:00 PM

How it works?


Staff area
Entrance /Exit
Storage
Kitchen
Washing area
Serving area
Entrance /exit
Storage
Handwash Area
Dining hall
Collection area


Hand wash area
Dining area
Serving area
Entrance
Kitchen
Service area



Assembly line
Open kitchen/open configuration
Island kitchen layout
Zoning layout
Galley layout

Space planning
Equipment selection
Safety and sanitation
Workflow
Circulation
Volume

1 **Problem clustering**
Of identified problems

Staircase gets slippery, especially when it rains	No safe storage for students' food items	Discomfort in holding the plate with food	Spoon station is unhygenic
Mess is not universally accessible	Students tend to forget their IDs and fake entries are made	**Utensils are difficult to separate because of suction**	Serving area layout is confusing
No sign of mess open/closed status from outside	Wash basin placement w.r.t platform is not ideal	Utensils are not dry to use	Chapatis/Dosas stick to each other
No space to keep belongings of students	Layout of washbasins is not ideal	Ladles sink/fall in food and get stained	No indication of what is inside drinks' dispenser
No place to hang umbrellas with proper drainage	No way to dry hands	Food cannot be identified by people of other regions	Liquid dripping prevents using the surface while filling

Solution exist Solution not Product-related

Not easy to spot empty table at a glance	Plates do not stack up properly	Uneven road, no ramp at the unloading bay	**Lifting and carrying around heavy utensils**
No way to locate a particular table without any markers	Used dishes rack doesn't specify which dishes to go where	No dedicated staff rooms	Transferring content from big to small utensils
Difficulty in locating switchboard and then map it to appliance	**Not so efficient food waste collector**	Insufficient storage racks	Cooking using oversized kitchen ware
We do not know if the jug is filled	Noise created by utensils clanging	No proper natural ventilation	Exhaust duct is not ideally planned
Mouth fresheners end up getting wet since taken after hand wash	Used dishes rack placed away from washing area	**Workstations are not designed as per human factors**	Single wash basin for the entire kitchen

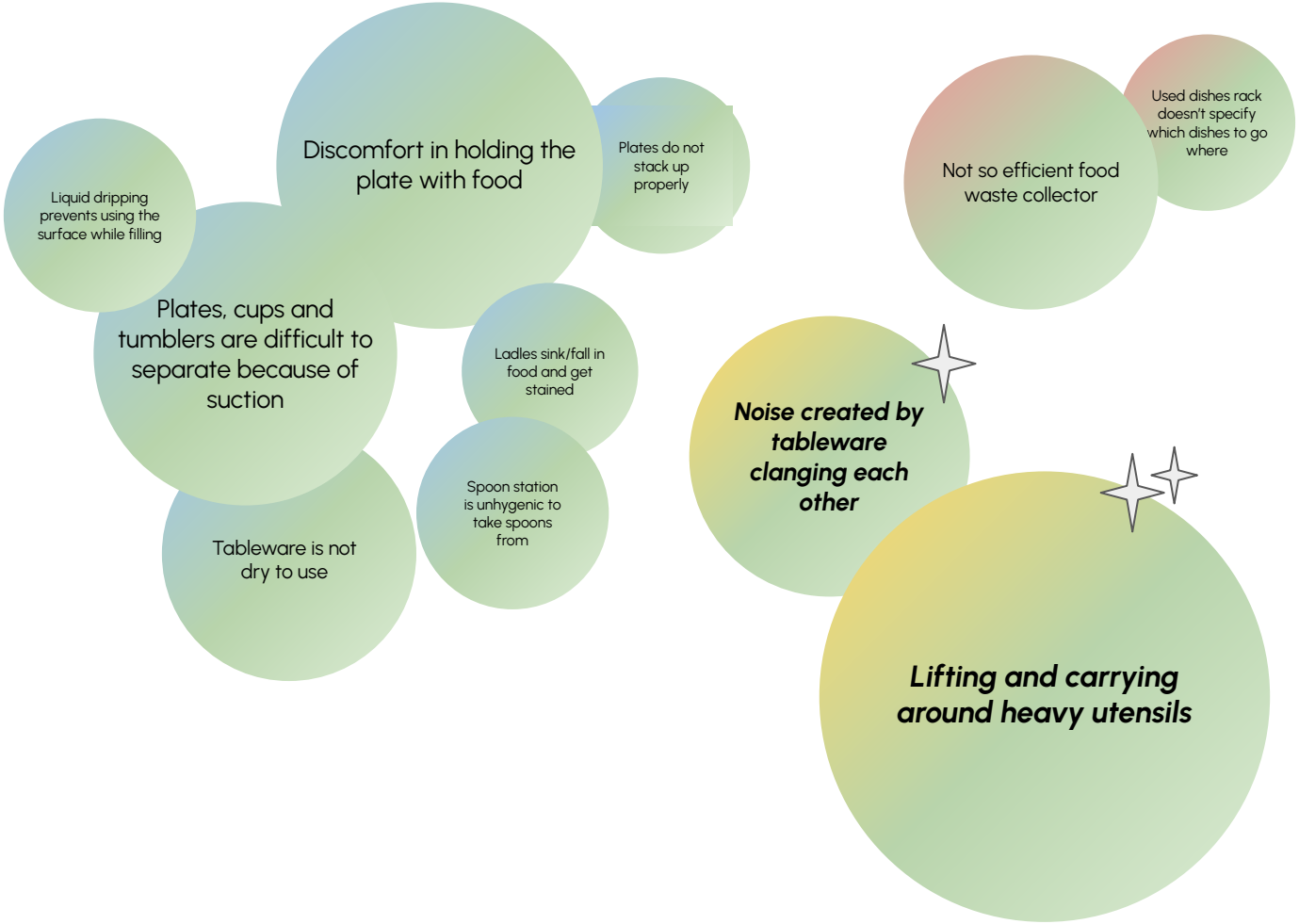
Solution exist Solution not Product-related

Floor is always watery and hence slippery	High temperature in working environment
Improper waste handling	No proper drainage around, floor is always wet
No provision of gloves	Space is too packed for big utensils
No provision of aprons	No dedicated space for washed utensils
No way to realise that the food in serving area needs to be refilled	Fire safety norms are not followed

- Utensils are difficult to separate because of suction
- Not so efficient food waste collector
- Workstations are not designed as per human factors
- Lifting and carrying around heavy utensils
- Floor is always watery and hence slippery

Solution exist

Solution not Product-related



Utensils and Handling

2 **Roleplay**
Empathising with users

ROLEPLAY: HEAD COOK

Namaste. I'm Murthy, Head cook of C-mess IISc bangalore. I have been associated with this mess from past 22 years. It's a very long time and cooking to students had been my passion all these years.

I stay in Hesaraghatta which is 32 kms from IISc ,I use 2 wheeler to commute to my workspace. The day starts for me at 4 when i get up and get ready for my work in early morning even though it's cold outside or raining because work is my priority as it's feeding our family from many years.

I reach IISc by 6am in the morning that is when my shift start and it lasts till 2pm that day after serving the students their second meal of the day.As one of the Head Cook i got 6 assistant cooks who will assist me in cooking breakfast and lunch and there are around 8 people to assist in dining area.

Usually, as we **cook for around 950 students** we use big utensils which are heavy to lift and to maintain because we can't cook multiple times using small utensils which may alter the taste and even not a feasible solution in sense of time. So, we have no option.We have to **transfer** the utensils near to the stove as **2 to 3 people will together** do that work and even lifting the filled utensils after cooking is not an easy task. So,we usually empty it by transferring it to smaller vessels which is easier to take it towards the dining area.

We use **cloth to avoid heat** while lifting and emptying the food to smaller vessels.We lift around 6-8 kgs of food while transferring it to the smaller vessels and smaller vessels weigh around 30 to 40 kgs.So,getting **shoulder and body pain**,knee pain and even **back pain** are the usual thing for me and my assistants. Sometimes the pain will be severe and we get a painkiller from the Health Centre once or twice in a month.Anyway our work should be go on and I can't take leave which may cost my salary cut.

So,this is my cooking life and I have been enjoying it well even though sometimes I get pain while working after all it's my passion now.

ROLEPLAY: TRANSFER ASSISTANT

Namaste, I'm A Shivkumar, from subedarpalya, Bengaluru.I have been associated with C Mess at IISC,bangalore from past 5 years . Usually I handle cleaning and transferring of utensils inside kitchen and dining area in the mess C.

As cooking is important aspect in any kitchen managing the utensils and transferring of the cooked food to dining area and getting back the plates and eateries for cleaning is also an important task for us. We have to cook for nearly thousand students we use **large utensils which are slightly difficult to lift and transfer**. So we use different trolleys for different sized utensils. Even trolleys can prevent our direct contact with hot utensils after cooking and less chance for mishandling.

We are using a **large used plate trolley** which have separate places dedicated for plates, glasses and spoons. But currently two such trolleys are not in good condition so, we are using that with the help of another trolley which was meant for carrying large utensils and we are **in short of the trolleys** because we have to keep the collection trolley for longer time and meanwhile there would be requirement in the kitchen area for the same. In such time we use **manual lifting** and **carrying** which will cause burning.

Sometimes **sprain** due to heavy weighing utensils with food. Wear and tear of hands is a common thing because while washing the utensils as we **don't use gloves** because of hard strains. I have seen many people here getting their hand injuries while cleaning the vessels .

We can use MODERN equipments if available for LIFTING but we think we really don't have patience and time to learn that and use it while cooking Because, in peak hours we should be good in time keeping as we use manual lifting of the utensils we are well managing it now . But sometimes when we got injured we feel that some things could have done better or with some assistance and it's like these are all common in this field of handling cooking and cooking utensils.

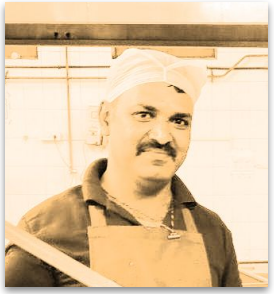
3 **Personal interviews**
Empathising with users

1. What is your name?
2. How old are you?
3. What is your height and weight?
4. Tell us about your family?
5. Where do you live and how do you reach the mess?
6. What is your work experience?
7. Since how long are you working here?
8. What is the duration of your work hours?
9. How often do you take leave?
10. How is your health?
11. What are the equipment you engage with ?
12. Did you experience any muscular pain in the past three months?
13. Where do you get hurt frequently?
14. On a scale of 5, how hectic is your work life?
15. When is your peak hour? What problems do you face then?
16. On a scale of 5, how easy is it to transfer dishes from vessel to vessel?
17. On a scale of 5, how easy is it to transfer vessel from one place to another?
18. On a scale of 5, how easy is it to mix in a large vessel?
19. How high you have to lift a vessel?
20. How much weight can you lift with ease?
21. How do you manage with hot vessels?
22. Did you or anyone you know get into any accidents while working? How?

Name: **Murthy**
Age, Gender: 40yr, Male
Family status: Married, 2 kids
Location: Yeshwantpur
Travel time: 20min from workplace
Mode of transportation: 2-wheeler
Experience: 23 yrs, 5yrs in hotel and 18 yrs in mess

Head Cook

- 2 times a week, takes medication whenever **knee hurts** and is casual about it.
- Does not find time to exercise and rests as he reaches home
- Experiences **back pain and shoulder ache** every now and then
- Feels **stressfu**l in the mess workplace compared to hotel kitchen, especially when cooking biryani
- If it is 50 kgs, will need two people to lift vessels
- Upto 15-20kg, can manage to lift the vessel
- Says that "People fall very frequently at mess and recently one of the cook in other mess **burn** himself due to steam while transferring boiling water and was hospitalised for 15 days."
- Each dish takes minimum 1 hr to prepare and they have to keep stirring it for more than 30mins.



Name: **Madhusudan**
Age, Gender: 42yr, Male
Family status: Married, 2 kids
Location: Yeshwantpur
Travel time: 20min from workplace
Mode of transportation: 2-wheeler

Cleaning staff

- Cleaning heavy utensils requires **help** while removing hard and oily strains.
- **Gripping** for large utensils is necessary as the existing utensils are slippery while cleaning.
- They found very difficult to handle utensils without **proper handle space** while carrying .
- They could not bring the trolley inside the cleaning area because lifting it back is difficult as there is no slant space to drag it.
- There is a sink for washing smaller utensils with proper height requirement but we do not have a bigger **wash basin** or chamber to keep the larger utensils and wash.
- They usually **bend and wash** the utensils keeping it on floor for a long time so, they often face **back ache and body pain.**
- They get **painkillers and sprays** for the body ache .
- They could not able to figure out what can be a proper solution for lifting and washing larger utensils as they have been practising it from longer period.

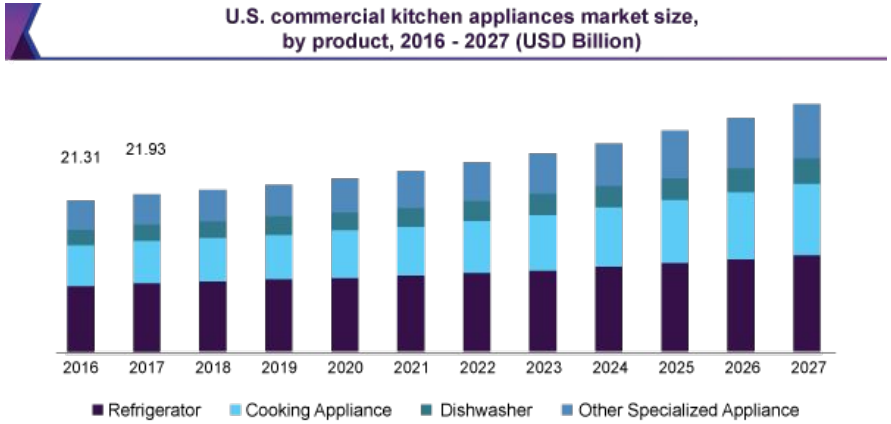
Transfer assistant

Name: **A Shivkumar**
Age, Gender: 42yr, Male
Family status: Married, 2 kids
Location: Subedarpalya
Mode of transportation: 2-wheeler
Experience: 5 years in C mess, IISc.

- Look after the **transferring and cleaning** of utensils .
- Works simultaneously inside kitchen area and dining area
- Uses **trolley** for transferring assistance
- Requires **help** while lifting the filled utensils
- He will be getting **sprain** after lifting heavy utensils whenever the trolley is unavailable.
- Trolleys are not **well maintained and lubricated.**
- Usually dust will fill up the space between trolley wheel which makes transfer of utensils harder .
- There is no **locking system** for trolley wheels so they have to make sure the trolley is steady while transferring and placing.
- There is no locking system for the utensils , But they are sure that the filled utensils won't fall off easily while transferring.. But, there are chances of empty utensils falling down the trolley.
- It is difficult to lift the used plate stand **from the trolley** as the wheels were damaged .

4 **Market study**
Understanding the scope

The global commercial cooking equipment market is expected to grow from **US$ 11,631 million in 2023 to US$ 23,094.7 million by 2033**, with overall sales accelerating at **7.1% CAGR** throughout the forecast period (2023-33). The rapid expansion of the HoReCa sector across the world is a key factor boosting sales of commercial cooking equipment in the market.



Futuremarketinsights.com, grandviewresearch.com

Drivers

Rapid growth of hospitality sector across the globe is expected to drive the global commercial cooking equipment market swiftly.

A growing number of quick-service restaurants across developed and developing regions will generate high demand for commercial cooking equipment in the market.

Restraints

Exorbitant prices of advanced commercial cooking equipment are expected to stymie the growth of commercial cooking equipment market in low-income regions throughout the forecast period.

Opportunities

Integration of novel technologies such as **IOT** is expected to generate lucrative growth opportunities for the market.

The development of **compact and cost-effective** products will further boost the market.

Threats

High maintenance costs of commercial cooking equipment may limit market expansion.

The **rising energy crisis** is also likely to negatively impact the growth.

KISS
KALINGA INSTITUTE OF SOCIAL SCIENCES

50,000+ meals
12 staff
130 volunteers

Steam cooking
4 Boilers (LPG,Diesel)

680 litres - 8 vessels - Veggies & Lentils
(Dalma - 2500 kg pulses, 2400 kg vegetables)
380 litres - 20 vessels - Boil rice (4000kg/day)

Solar energy
10,000 litres hot water/day

Bio-gas plant
1000 kg waste/day, 75 cum biogas

Stainless Steel
100-150 kg
INR 5,500/unit
50 x 73 cm Platform

Platform on 4-wheels with a push handle

Mild Steel
50-100 kg
INR 54,000/unit

Platform on 4-wheels with a push handle and scissor lift

Mild Steel
4 shelves, 100-200 kg/layer
INR 3,800/unit

Cantilever Racking system

Stainless Steel
50-100 kg
INR 1,45,000/unit

Motorized platform trolley on 4-wheels with a control integrated push handle

Non-magnetic stainless steel
0-500 kg/hr
INR 82,000/unit

Double wall insulated rice boiler machine with control valves with inlet/outlets and strainer

Aluminium
0.25-250 kg self weight
1.7-2000 litres capacity
8-100' dia
INR 100/kg

STUDY-1

- The study found that the prevalence of work-related musculoskeletal disorders (MSDs) among male kitchen workers in the catering industry in South India is **67.5%**.
- The most affected body parts were the **lower back (65.8%) and shoulder region (62.3%)**. Chief cooks were more likely to suffer from MSDs than assistant cooks and kitchen aides.
- Workers in the older age group (≥41 years) and workers with 6–10 years of experience were also at **higher risk of MSDs**.
- The study concluded that male kitchen workers are exposed to both MSDs and ergonomic hazards. Employers should take steps to reduce the risk of MSDs in this population, such as providing **ergonomic training and equipment, and by implementing work-rest schedules**.

https://ehs.unc.edu/topics/ergonomics/lifting-and-material-handling/

STUDY-2

- Survey results of questionnaire show that heated cooking constitutes the largest part, followed by non-heated cooking, and preparation.
- Accidents during preparation were caused mainly by **machine and tools (86.7%)**, and most victims were injured in the forms of getting caught in and between **objects (45.7%) or with cuts, amputations and punctures (43.9%)**.
- Cooking utensils and caldron were behind **55.4% of the accidents, and 73.3% of the accidents during heated cooking processes** revealed problems with abnormal temperature.
- Accident during handling/storing ingredients and serving were most commonly in the forms of slips and falls.
- Cooks are frequently exposed to hot pans or fryers, increasing the risk of burns, and slips and falls due to moisture on kitchen floors.

https://www.sciencedirect.com/science/article/abs/pii/S0925753515001782

STUDY-3

Weight of Objects: Where possible, **use mechanical means** such as forklifts or hand trucks to transport heavy items. **Ramps** can be helpful **in moving heavy items** from one level to another.

Awkward Postures: Move items close to the body and use the legs when lifting from a low location to **minimize bending and reaching**.Store and place materials that need to be manually lifted at the **"power zone": mid-thigh to mid-chest** height. This can be accomplished by placing objects on shelves, tables, racks

High-Frequency and Long-Duration Lifting: Plan ahead when beginning work that will require high-frequency and long-duration lifting. This way, the work can be organized in such a way so as to **minimize the time workers spend holding loads**.

Inadequate Handholds: Where possible, **utilize handholds** such as handles, slots, or holes that **provide enough room for gloved hands.**

https://ehs.unc.edu/topics/ergonomics/lifting-and-material-handling/

4 IS Questionnaire
Understanding the situation

Information about system to be improved		
Name	Vessels, Ladles, Trolley	
Primary Function	Transferring food content in and around the kitchen	
Structure	Vessels: Cylindrical containers with flat/ curved bases, in some cases with taps, tiltable Ladles: Long handles with scoop/mesh/bowl heads Trolley: Height adjustable trolley (scissor lift/hydraulic) with flat platform on wheels, pushed by handlebar	
Functioning	Aids in reducing human effort	
System environment	**How it (should) interacts with super system of which it is part**	Carries food with minimal human effort
	With any other system with which it interacts, or in proximity	Vessels-Stove, kitchen floor Ladles-Vessels, Covering plates Trolley-Kitchen area
	Natural system surrounding it	Kitchen, Serving area

Available resources	
Substance: Materials	Metal, Water, Cloth, Food, Bones, Skin, Muscles, Blood
Field: Energy/actions	Heat transfer, Mechanical displacement, Frictional forces, Light and Ventilation
Functional	Fluid properties of food
Informational	Improper dealing can lead to Injuries/Musculo-skeletal disorders

Information about the problem situation	
Drawbacks to eliminate / desired improvements	Ergonomic design To avoid Heavy liftings and awkward postures To avoid Work related musculo-skeletal disorders and injuries To avoid spillage during Food transfer
Mechanism causing the drawback to occur, if clear	Constraints caused due to human limitations
History of problem development	Labour intensive process Inefficient equipment
Other problem to be solved: modify or direction of development?	Improve work efficiency Making the kitchen workplace safer and comfortable

Changing the system	
Allowable changes	Equipment and way of doing things
Limitations to change the system	Size of the Openings and Aisles, Budget

History of attempted solutions to the problem	
Previous attempts to solve the problem: why they failed also	Cost effectiveness Sticking to traditional methods
Other systems with problem: solved? Apply? Why not?	Budget and Infrastructure

Criteria for selection of solution concepts	
Desired technological characteristics	Sturdy, Stable, Light weight, Affordable, Ergonomic, Ease of usability
Desired economic characteristics	Relatively inexpensive so commercial kitchens like mess could get multiple ones
Expected degree of novelty	Mechanical advancements
Other criteria	Patents, Safety rules and regulations, Desirability

Thank
you.