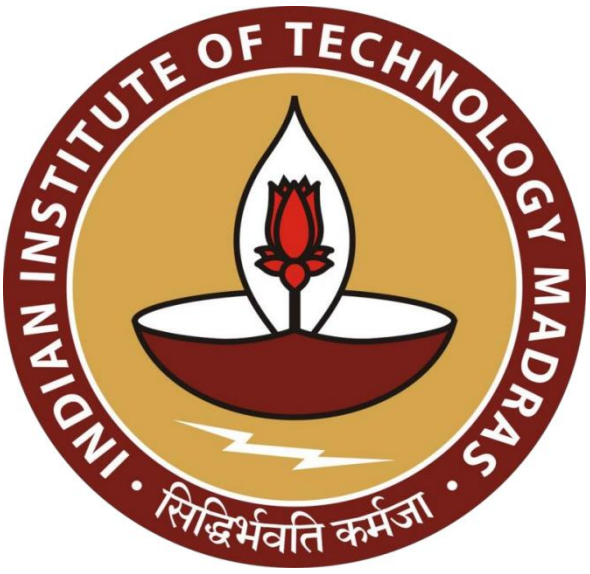
INDIAN INSTITUTE OF TECHNOLOGY MADRAS

BUSINESS DATA MANAGEMENT CAPSTONE PROJECT

FINAL REPORT



Analysis of Food Management System in Railway Running Room

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Date of Submission: 17th June 2023

INDEX

I.EXECUTIVE SUMMARY:

One of the most important means of transport in India is Railways. Indian Railways contribute a lot to the Nation's economy. For the smooth functioning of Railways, Some big Railway Stations have Running Rooms, which are the rest areas for the crew of the Railway. The crew includes ALP(Assistant Loco Pilot), LP(Loco Pilot), Goods Guard, etc.

Running Rooms require a high level of attention to ensure the crew rests properly and conveniently. All the required and necessary facilities should be made available for the well-being of Railway Staff. A Running Room is associated with the crew Lobby where all the information regarding Trains running is provided to the crew. A member of the crew is forbidden to use Running Room in Home Station. There are hundreds of Running Rooms in India, which will be working on a tender basis to serve the Railway Crew. South Central Railway has 6 divisions and under each of them, there are some finite Running Rooms. There will be an inspection in Running Room by CLI(Chief Loco Inspector), DRM(Divisional Railway Manager), ADRM(Additional Divisional Railway Manager), GM(General Manager), and AGM (Additional General Manager) to ensure the best performance of Running Rooms.

After the report of the Inspection, Supervisors along with Contractors make sure of rectifying the mistakes if any. There will be Foreman for every Running Room with 1-2 Supervisors, Kitchen Staff, around 10 call boys, etc.

Even though this is a non-profitable management system, the main problem in Running Room concerning food management is the wastage of food. When a group of 150-200 Railway Crew is to be supplied food, there is a chance of dissatisfaction with taste, way of serving, etc. And approximately 5 state Crew have rest in Kazipet Running Room. But the number of drivers coming to Running Room varies day by day. This is the main reason for the wastage of food.

The meals provided in the Running room are completely subsidized meals. Therefore concern regarding the amount being spent for the food is less and there is more attention towards serving the crew satisfactorily and securely.

The challenges that are faced by Running Rooms are :

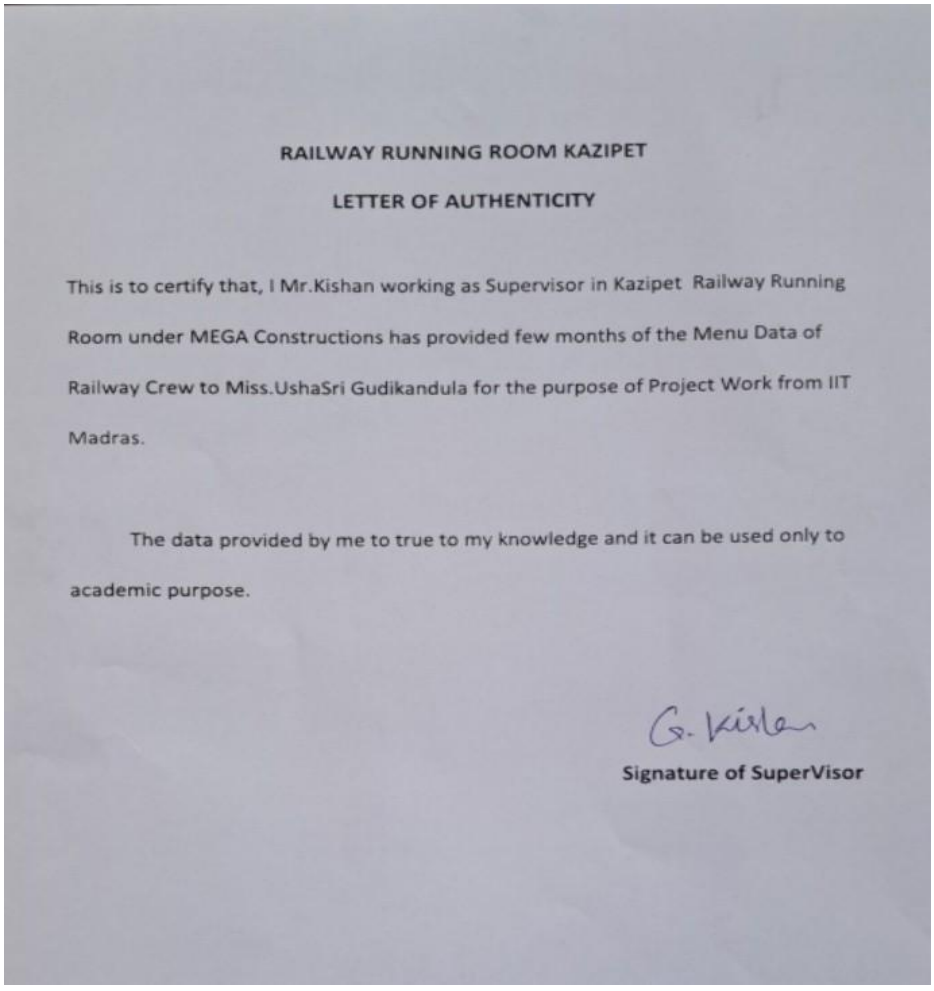
- A huge amount of Food is Being wasted

- Crew Complaining regarding different issues (Slow service, poor quality, etc)
- Difficulty in estimating the amount of Food to be Cooked
- Non Technical problem is the irregularity of the staff of the Running Room

The Project aims to get an idea of how the Food Management System is working in Running Rooms. As it's most important for the safety of the Railway Crew, the initial target is to address various problems and concerns faced in the maintenance of the Running Room. The initial target is to find different ways to reduce the wastage of food based on different aspects.

Proof Of Originality:

1. Letter of Authenticity



RAILWAY RUNNING ROOM KAZIPET

LETTER OF AUTHENTICITY

This is to certify that, I Mr.Kishan working as Supervisor in Kazipet Railway Running Room under MEGA Constructions has provided few months of the Menu Data of Railway Crew to Miss.UshaSri Gudikandula for the purpose of Project Work from IIT Madras.

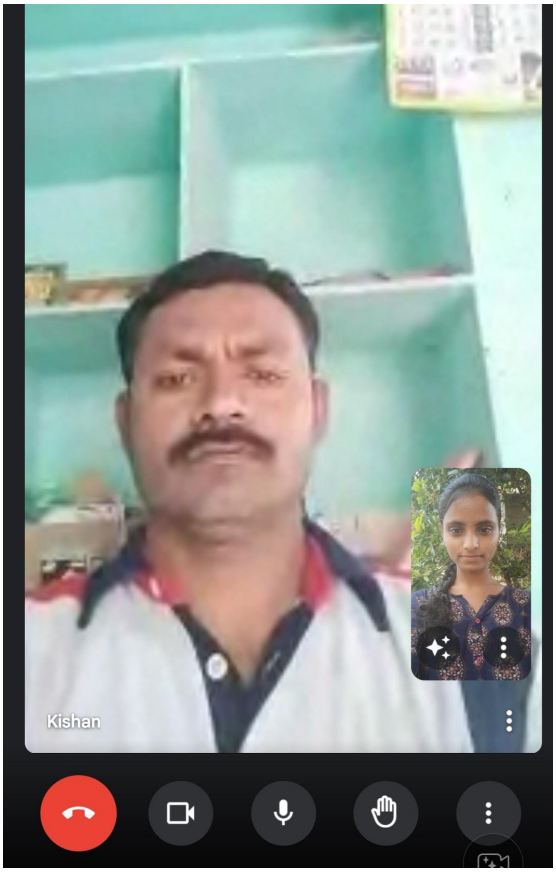
The data provided by me to true to my knowledge and it can be used only to academic purpose.

G. Kishan

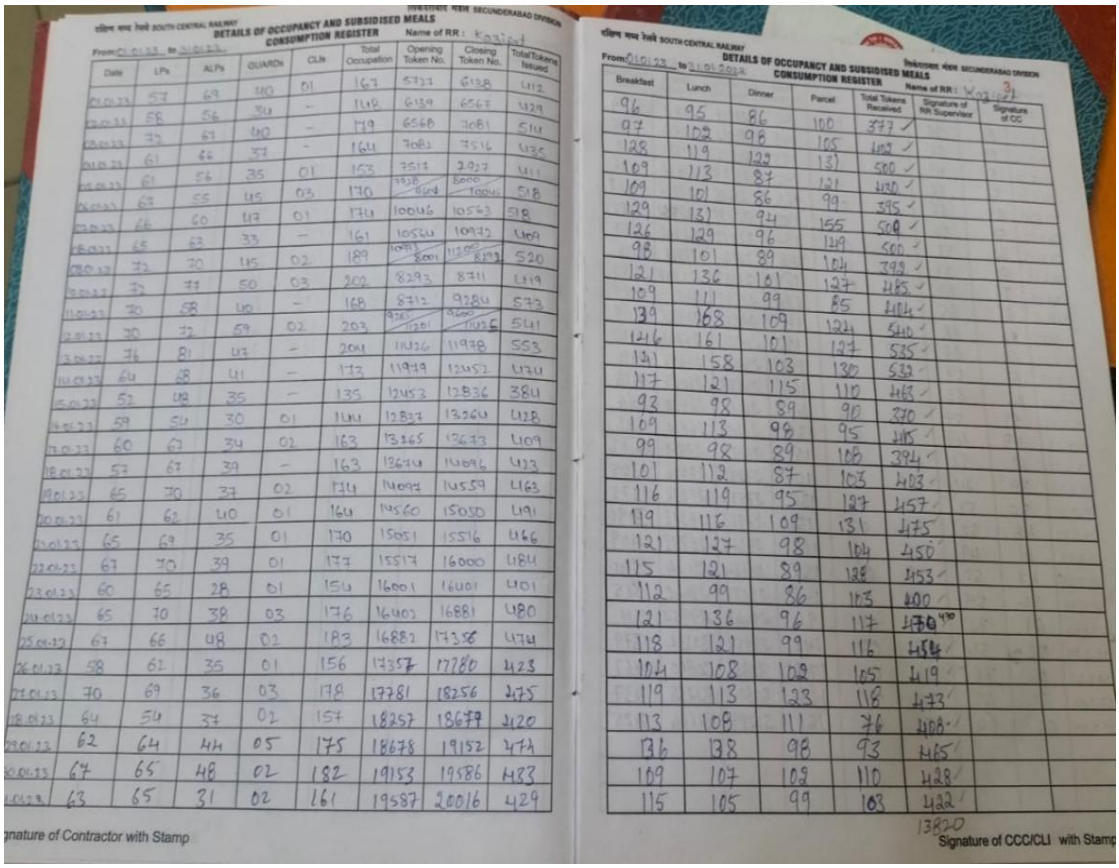
Signature of SuperVisor

2. Photograph of the Dining Hall in Running Room Kazipet

2. Photograph of Interaction with Supervisor of Running Room Kazipet



4. Sample of Data in Paper Form.



DETAILS OF OCCUPANCY AND SUBSIDISED MEALS CONSUMPTION REGISTER

Date	LPs	ALPs	GUARDs	CLIs	Total Occupation	Opening Token No.	Closing Token No.	Total Tokens Issued
01.01.23	57	69	40	01	167	5721	6138	417
02.01.23	58	56	34	–	148	6139	6567	429
03.01.23	72	67	40	–	179	6568	7081	514
04.01.23	61	66	37	–	164	7082	7516	435
05.01.23	61	56	35	01	153	7517	2027	511
06.01.23	63	55	45	03	170	7938 / 864	8000 / 10046	518
07.01.23	66	60	47	01	174	10046	10563	518
08.01.23	65	63	33	–	161	10556	10972	416
09.01.23	72	70	45	02	189	10983 / 8001	11500 / 8393	520
10.01.23	72	73	50	03	202	8293	8711	418
11.01.23	70	58	40	–	168	8712	9284	573
12.01.23	70	72	69	02	203	9285 / 1201	9800 / 11025	541
13.01.23	76	81	47	–	204	11026	11578	553
14.01.23	64	68	41	–	173	11979	12452	473
15.01.23	52	48	35	–	135	12453	12836	384
16.01.23	59	54	30	01	144	12837	13260	423
17.01.23	60	67	34	02	163	13265	13673	409
18.01.23	57	67	39	–	163	13674	14096	423
19.01.23	65	70	37	02	174	14097	14559	463
20.01.23	61	62	40	01	164	14560	15050	491
21.01.23	65	69	35	01	170	15051	15516	466
22.01.23	67	70	39	01	177	15517	16000	484
23.01.23	60	65	28	01	154	16001	16401	401
24.01.23	65	70	38	03	176	16402	16881	480
25.01.23	67	66	48	02	183	16882	17356	474
26.01.23	58	62	35	01	156	17357	17780	423
27.01.23	70	69	36	03	178	17781	18256	475
28.01.23	64	54	37	02	157	18257	18677	420
29.01.23	62	64	44	05	175	18678	19152	474
30.01.23	67	65	48	02	182	19153	19586	433
31.01.23	63	65	31	02	161	19587	20016	429

Signature of Contractor with Stamp

DETAILS OF OCCUPANCY AND SUBSIDISED MEALS CONSUMPTION REGISTER

Breakfast	Lunch	Dinner	Parcel	Total Tokens Received	Signature of Inth Supervisor	Signature of CC
96	95	86	100	377 ✓		
97	102	98	105	402 ✓		
128	119	122	131	500 ✓		
109	113	87	121	430 ✓		
109	101	86	99	395 ✓		
129	131	94	155	508 ✓		
126	129	96	129	500 ✓		
98	101	89	104	399 ✓		
121	136	101	127	485 ✓		
109	111	99	85	404 ✓		
139	168	109	124	540 ✓		
126	161	101	127	535 ✓		
141	158	103	130	539 ✓		
117	121	115	110	463 ✓		
92	98	89	90	370 ✓		
109	113	99	95	415 ✓		
99	98	89	108	394 ✓		
101	112	87	103	403 ✓		
116	119	95	127	457 ✓		
119	116	109	131	475 ✓		
121	127	98	104	450 ✓		
115	121	89	128	453 ✓		
112	99	86	103	400 ✓		
121	136	96	117	470 ✓		
118	121	99	116	454 ✓		
104	108	102	105	419 ✓		
119	113	123	118	473 ✓		
113	108	111	76	408 ✓		
136	138	98	93	465 ✓		
109	107	102	110	428 ✓		
115	105	99	103	422 ✓		

13820

Signature of CCC/CLI with Stamp

II.DETAILED EXPLANATION OF THE ANALYSIS PROCESS:

To analyze the data, we will be using Microsoft Excel, and different features like PIVOT Table, GRAPHS, Mathematical Formulas of it are also used. An in-depth analysis should be done to summarize the things.

The data that is collected is in the form of paperwork. Everything is manually entered into the Excel sheet and further calculations are done. The Data collected is of 3 months i.e., February, March, and April. As it is the manual entry of the data, the data cleaning task is less and some of the missing values are found and not entered in the sheet. All the data that was available was made in a structured format to ensure the data integrity and consistency in variables.

Usage of Various tools on various information provided in data gives us different dimensions and insights to conclude the data. Some of the Data values have been sorted as some charts like Pareto required sorted values to calculate the cumulative Values.

- Firstly Each month Total Number of Crew each day, Number of Breakfasts, Number of Lunch, and Number of Parcels are entered column-wise, and using the MEAN function in Excel Average of each column is calculated and respective Stacked bar charts are created as Stacked Bar Chart is an effective tool in Data Analysis. It has been used to analyze the average intake of the crew and the average of various meal types in 3 months.

- Pareto Analysis can be done to know the prioritized menu. In this case, Pareto Analysis is used to know the menu which is being wasted in less quantity and which is being wasted in high quantity, and which item can be made available less/more respectively to reduce the wastage. For the Pareto Analysis,

ITEM	WASTAGE	CUMULATIVE	PERCENTAGE
TOTAL VEGETABLES	170	170	31%
RICE	120	290	53%
….	…	…	…
….	…	…	…
CHAPATI	30	550	100%

For the Pareto Analysis, Items and their wastage are entered in 2 columns in decreasing order of the amount of wastage and cumulative, and the percentage of wastage has been calculated and Pareto chart has been made.

- Individual Wastage Calculation Percentage can be calculated using

$$\text{Wastage Percentage of an Item} = \frac{Total\ Amount\ that\ has\ been\ wasted}{Total\ amount\ that\ has\ have\ been\ cooked} \times 100$$

For ex: If an item is cooked in 30 kg and 5 kg of it is wasted, now the wastage percentage of it is (5/30) *100 = 16.7%

Bar charts and Line charts are combined to visualize the different items being cooked and wasted.Bar Chart is used to visualize the amount of item cooked and line chart represents the amount of it wasted.

- A stacked Bar Chart is used for the analysis of Item wise wastage based on meal Type. For this, Meal Type and the particular item are considered as variables in the table and the respective cell contains the amount of that particular item cooked in that meal time. Based on this table Stacked bar chart has been constructed.

- Pie Charts can help us show the data as a percentage of a whole.

	Rice(Kg)	CHAPATHI(Kg)	---	--	Total Wastage
Breakfast	0	0			4.5
Lunch	3	0.5			7
Dinner	2	0.5			5.5

The Table is constructed in the above manner and a Pie Chart is created using the Column of Total Wastage which visualizes the percentage of wastage during different meal times.

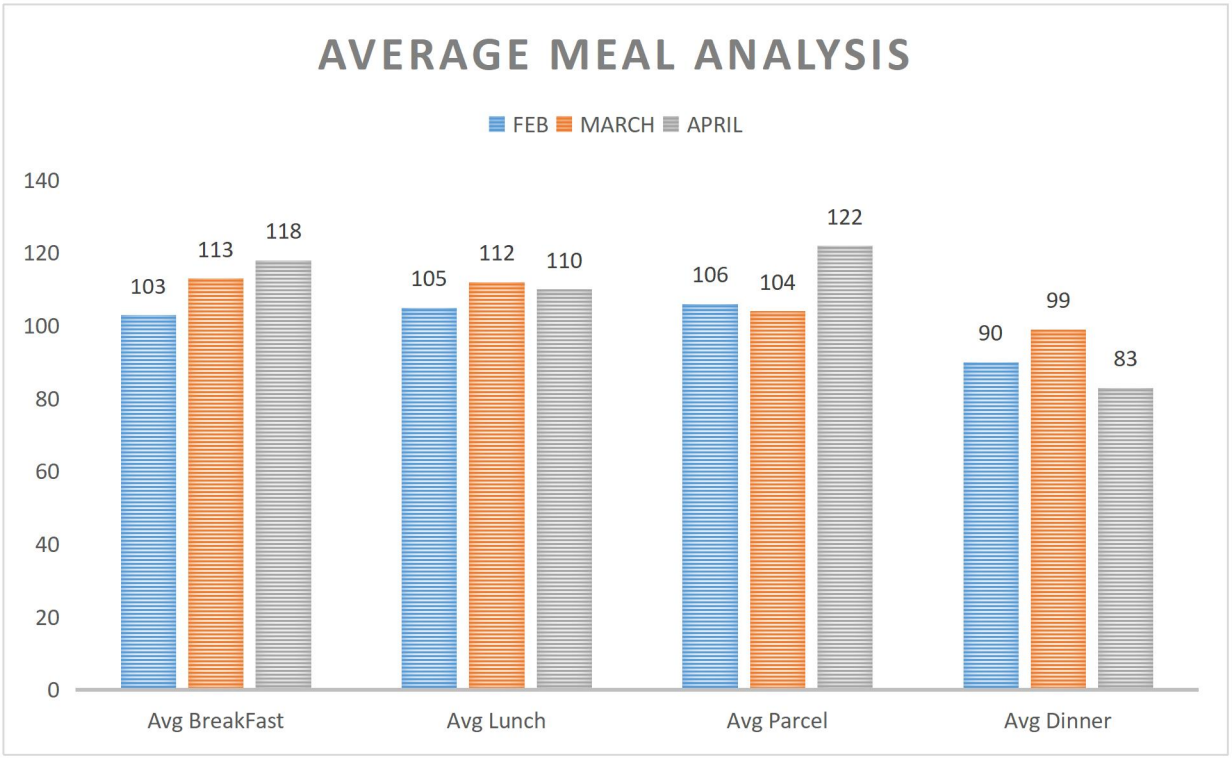
- Line Chart gives us the trends in the data. It is used to plot and visualize the lowest and the highest values. A line Chart has been used to plot the number of issues in the Running Rooms. The high trend in line can be addressed and rectified.

- SUM, AVERAGE, QUARTILE.INC and ROUNDUP are some of the tools that are used to Finalize the values in the tables and are further used for visualizing various graphs.

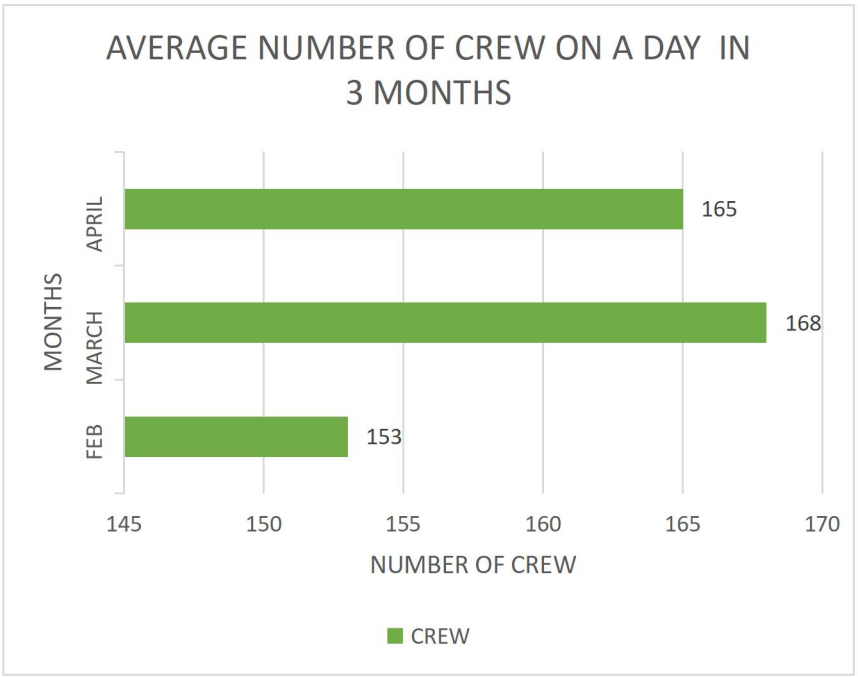
- Pivot Table has great advantages over all the tools. It has been used to sum up many columns in the data and the values like MIN, and MAX are found for graphs.

III.RESULTS AND FINDINGS:

i. Month-wise Analysis of the Average of Food based on Meal Type



Graph1



Graph2

From *Graph1* and *Graph2*, We can get an idea of the mean of meals in Running Room Kazipet. The following inferences can be made from the analysis of the graph:

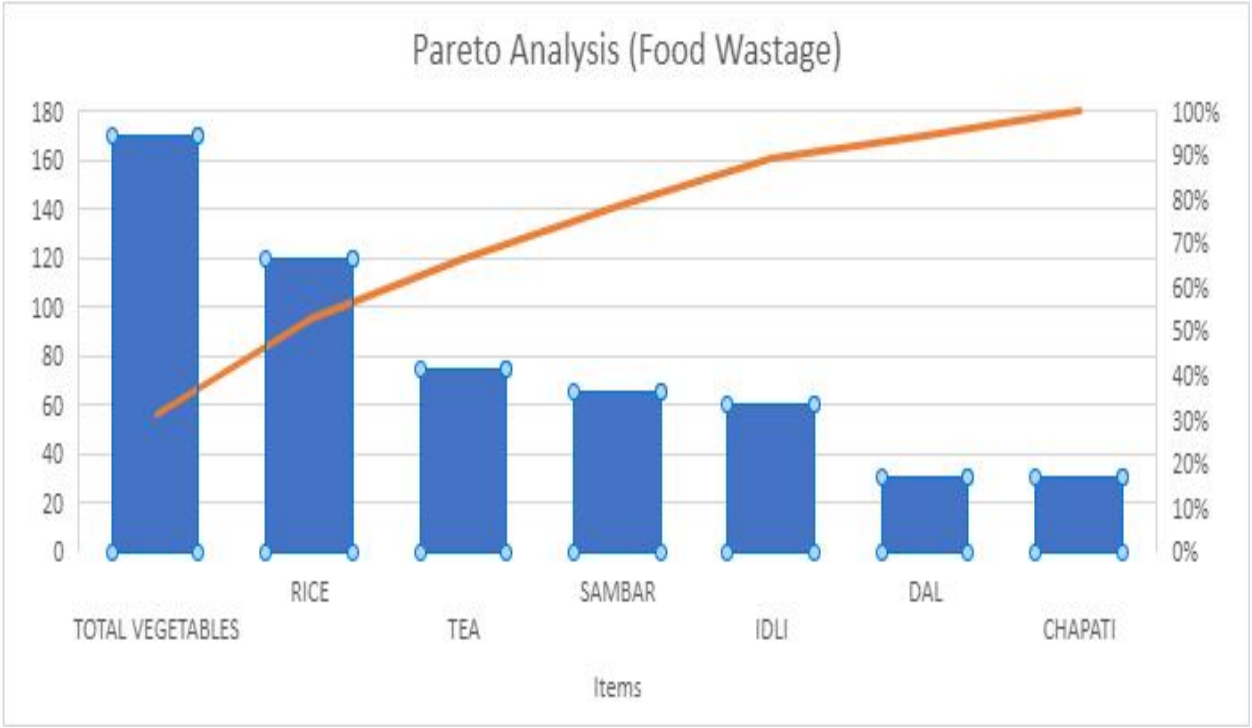
✧ The average of Lunch Breakfast and Parcels in the 3 months are in the Range [100,125]

✧ The average of Parcel is almost the same as that of Lunch and Breakfast. This is so because providing the crew with a sealed pack of food is mandatory. And also sometimes it is even higher than lunch and breakfast because of this reason.

✧ The average for Dinner is low compared to that of lunch and breakfast. This is because most trains run during the daytime and less number of crew will be in their duty hours during the night. Hence the reason for less average of dinner

✧ The average number of the crew in to the Running room lies in the range [160,170]. As February has only 28 days the average crew of it is less compared to the Months of March and April.

ii. PARETO ANALYSIS of Food Wastage of one month

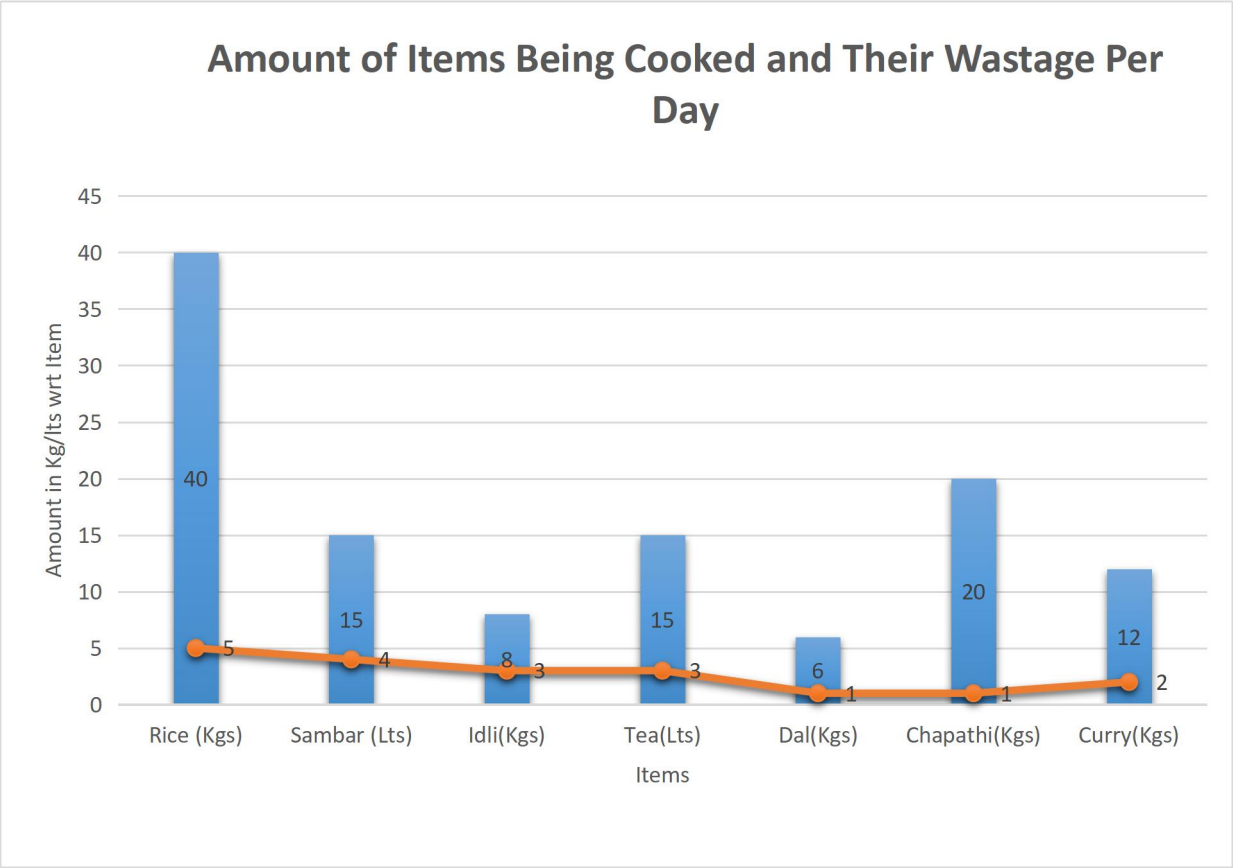


Graph3

From the Pareto Analysis, we can depict that 80% of the total wastage in Running Room Kazipet during a period of one month is contributed by the first four items in the graph I.e., Total Vegetables, Rice, Tea, and Sambar.

As these items are regular and mandatory every day, there is a high involvement of these items in the total wastage whereas Chapathi contributes in less percentage to the total Wastage. This is because as we have seen in *Graph 1* Parcel have more average and many crew prefer chapati in their parcels and there is no wastage recorded from the parcel.

iii. Daily wise food Consumption and Wastage



Graph4

This graph*(Graph4)* gives us an idea about the number of different items being used(Bar Graph) and the same item being wasted(Trend Line). Upon calculating the individual waste percentages of different items in a day, we get the following values

- Waste Percentage of Rice = (4/50)*100 = 12.5%

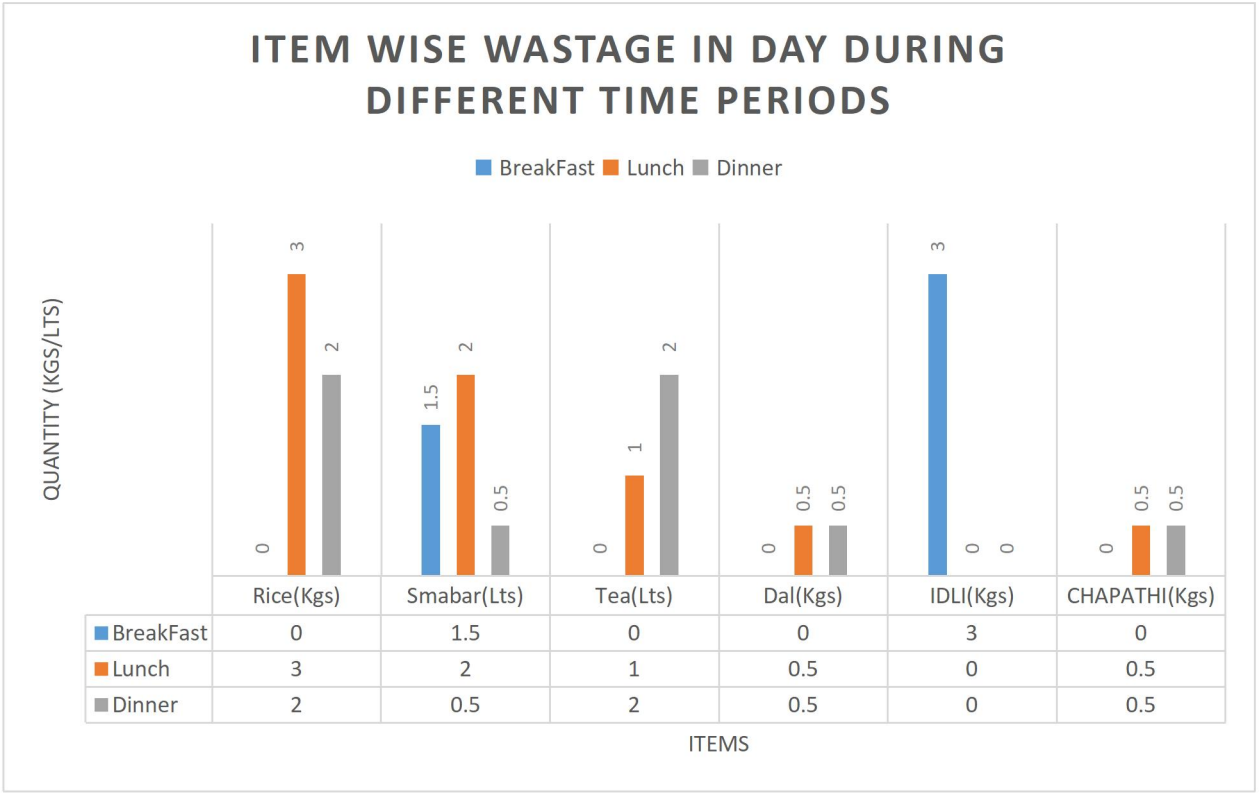
- Waste Percentage of Sambar = (4/15)*100 = 26%
- Waste Percentage of Idli = (3/8)*100 = 37.5%
- Waste Percentage of Tea = (3/15)*100 = (1/6)*100 = 16.7%
- Waste Percentage of Chapathi = (1/20) *100=5%
- Waste Percentage of Curry = (2/12)*100 = 16.7%

From the above-calculated values we can conclude that Idli is also one of the items which is contributed in high amount to the total wastage in a day.

iv. Item Wise Wastage based on Menu Type in a Day

The below graph visualizes the item-wise wastage based on the Menu Type. Here Zero(0) value in the graph indicates that the corresponding item is not being served during that time.

The most items during lunch that are wasted are Rice, Sambar, and Tea. Idli constitutes more wastage in the BreakFast. As a favorite menu, Chapathi is not wasted so much. Tea during lunch is like a dish being served at odd hours. That is the reason for the huge contribution to the total daily waste.

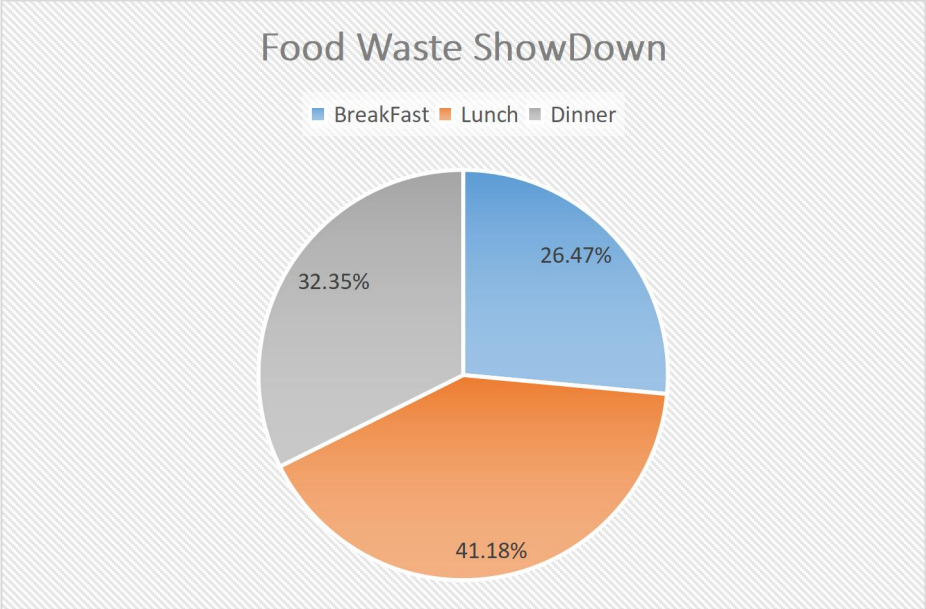


	Rice(Kgs)	Smabar(Lts)	Tea(Lts)	Dal(Kgs)	IDLI(Kgs)	CHAPATHI(Kgs)
BreakFast	0	1.5	0	0	3	0
Lunch	3	2	1	0.5	0	0.5
Dinner	2	0.5	2	0.5	0	0.5

Graph5

v . Food Wastage o each Meal Type Per Day

The below chart*(Graph 6)* sketches various percentages of waste during each meal time in a day. 'Breakfast vs. Lunch vs. Dinner' is important to know where to limit the amount of food being cooked. So by the Chart, we can understand that lot of food is being wastage during lunchtime & the least amount is during breakfast.



Breakfast vs. Lunch vs. Dinner *Graph5*

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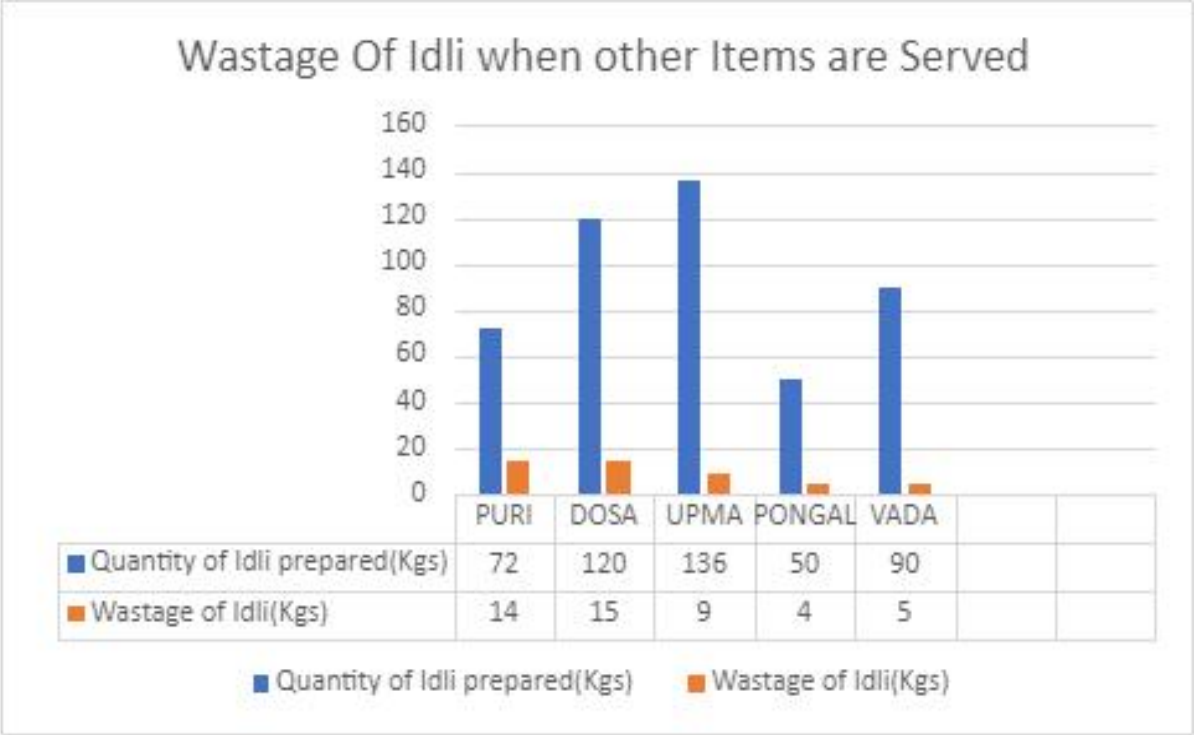
Even from *Graph 5,* we can see that amount of Rice Sambar is wasted in huge amounts during lunch hours. This is the significant reason for the higher involvement of Lunch wastage to whole wastage. As Parcel involves taking the food outside the Running Room by the crew it doesn't contribute to any of the food wastage.

vi. Wastage Visualization of one of the menu Items

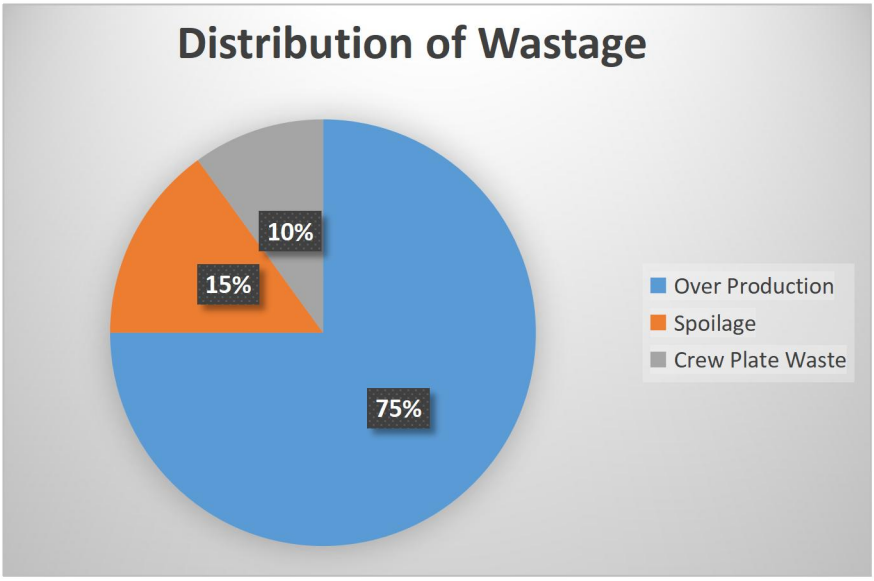
From the Data*(Graph7)* we can infer that IDLI is a regular and also highly wasted ingredient. So the wastage of it depends upon the other menu items served on the day. From the graph below we can infer that when the other items are puri and dosa, Idli is being highly wasted. So the quantity of Idli should be less when these Items are served. As items like PURI, and DOSA are highly preferable for breakfast than IDLI, and also as IDLI is the regular menu item for breakfast it is not the most chosen one.

PONGAL is the menu item that will be cooked as it was on the menu. It's not the most preferable one hence we can see less wastage of IDLI during PONGAL was cooked. In this way, one of the major wastage can be reduced.



Graph7

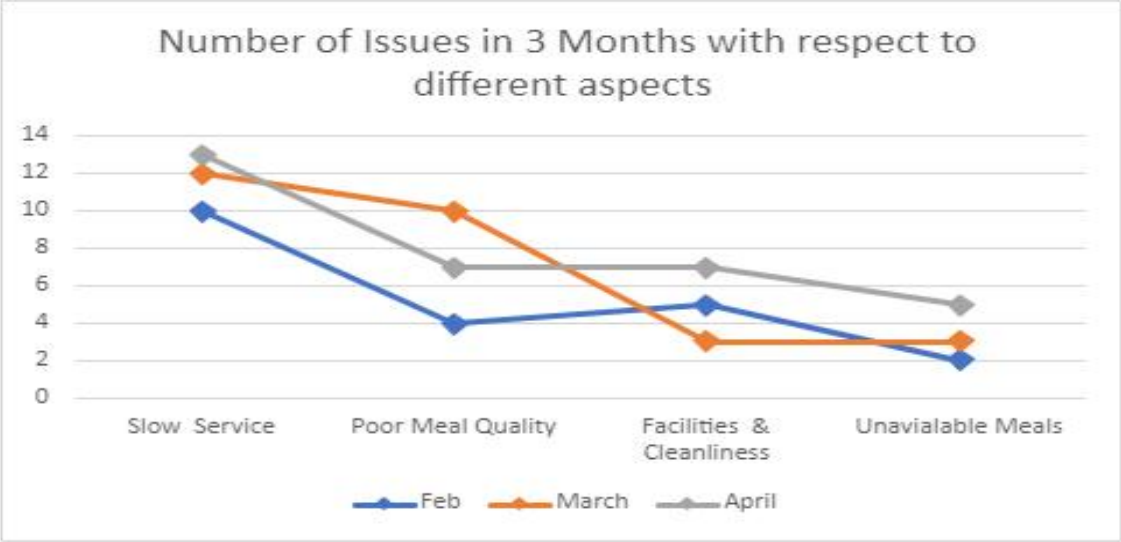
vii. Distribution of Wastage of Food



Graph8

Considering the above Pie Chart*(Graph8)*, We can know that the major reason for the wastage of food is Over Production. As there is a lot of inconsistency regarding the crew count, there is a huge imbalance in the amount of food that is being cooked. Over Production of food leads to spoilage of food. Crew Plate waste is also a reason for the wastage. This is happening because of the native places of the Crew. They will not be satisfied with the taste they are being provided with and hence the wastage.

viii. Visualization of Complaints in Running Room.



Graph9

The line graph(Graph9) is used to illustrate the number of issues in different aspects in February, March, and April.

If we look into the average number of issues in different aspects,

- Slow Service : 12(approx)
- Poor Meal Quality: 7
- Facilities & Cleanliness: 5
- Unavailable Meals: 2

From the above calculations, one can infer that Slow Service is the big issue in Running Room as the average of it is high compared to other aspects. Slow service is because of the irregular attendance of the Running Room staff. Due to a lack of Staff, service gets delayed for a period of short time. But this will be a major issue for the crew and leads to dissatisfaction. This irregularity of staff also leads to issues in Cleanliness and Facilities. The reasons for issues in Poor Quality in meals will be disliking the menu or the taste may not be satisfactory. As there is a lot of food wastage, there are only 2 issues in the aspect of Unavailable Meals.

III. INTERPRETATION OF RESULTS and RECOMMENDATIONS

- ✓ From all the results we can get to the conclusion that the crew coming to the Running Room on average is in the range [160-170]. And also there are some cases where the number of crew will be out of this range. And the range of the number of lunch, breakfast, and parcel is [100,125] whereas dinner lies in the range [80,90]. So by these values and considering them as the measure, various menu items can be cooked and served instead of directly cooking for a big number of daily. Since the number during dinner time is less, Fewer amounts of menu items can be cooked.

- ✓ As Chapathi is the most preferred item during parcel, dinner times Amount of Rice to be cooked can be reduced to reduce the wastage.

- ✓ We can also see that there is a lot of wastage of Rice & Sambar during Lunch Times. And also from *Graph* 1, We can see the average number of lunches in 3 months. They roughly lie in the range [105,110]. So by using this value amount of rice can be balanced and cooked.

- ✓ Tea during lunchtime is also leading to huge wastage. Also, according to the rules, it should be available during the whole day to ensure the satisfaction of

the crew. So the amount of tea can be made available in less quantity during the afternoon hours.

- ✓ From the individual wastage calculated, we can conclude that 1/3rd of Idli and 1/4th of Sambar that are being cooked are wasted. Using the range in the average no of breakfasts in Graph 1, the amount of these items to be cooked can be reduced. And a general assumption can be made that as Idli is being served daily, one can feel eating bored with it. Hence instead of cooking a fixed quantity daily i.e., 8 kg, it can be brought to 6.5 - 7Kgs

- ✓ Also, the Wastage of Idli depends on other items that are being cooked on that day. So if there are items that are much prioritized than Idli, then definitely quantity of Idli should be reduced. For example, Consider *Graph* 7 On a day when VADA is cooked, IDLI is not being wasted much, it is because many prefer the combo of IDLI & VADA but where on a PURI day, a high quantity of IDLI is being wasted. So this inference should be taken into consideration.

- ✓ We can also see the average number of Complaints regarding the service in the Running Room is 11. The Supervisor can keep a regular register for the attendance and that record should be used while paying the staff. This may bring the to regular attendance of them and ensure effective staff performance.

- ✓ We can also see a few complaints about the poor quality of food, For this the supervisor can regularly take the feedback of the crew regarding the taste, and quality and ensure them effectively regularly to avoid the next complaint. Many advanced cleaning tools and room sprays can be used to ensure the cleanliness of the Running Room.

- ✓ As there is less wastage in chapati and puri, if there is more availability of these items instead of other items may be profitable.

- ✓ Since More Wastage in a Day is taking place during lunchtime, Considering the average values and cooking will help.

- ✓ If some good chefs can be hired, then it can also be one of the ways to reduce wastage since the change in taste can be seen.

- ✓ FIFO(First In First Out) METHOD should be made work effectively to overcome the problem of spoilage of ingredients

Conclusion:

In Conclusion, an effective food management system is necessary for Running Room to succeed in its working principle. By Conducting a thorough analysis of various aspects like menu, quality, waste management, and staff performance running room can identify some of the challenges and can do improvements.

Based on the Analysis, it is crucial to focus on optimizing the menu by observing various trends and changes in the number of crew, average values, etc. Quality control should be a high priority in the case of Food. Addressing crew feedback regularly is also a significant task to be maintained. Finally, Actively monitoring the satisfaction levels of the crew is the foremost task of the Running Room.