

Addressing Cycle Time for Cleaning Tables at Tamil Wedding Dining Halls

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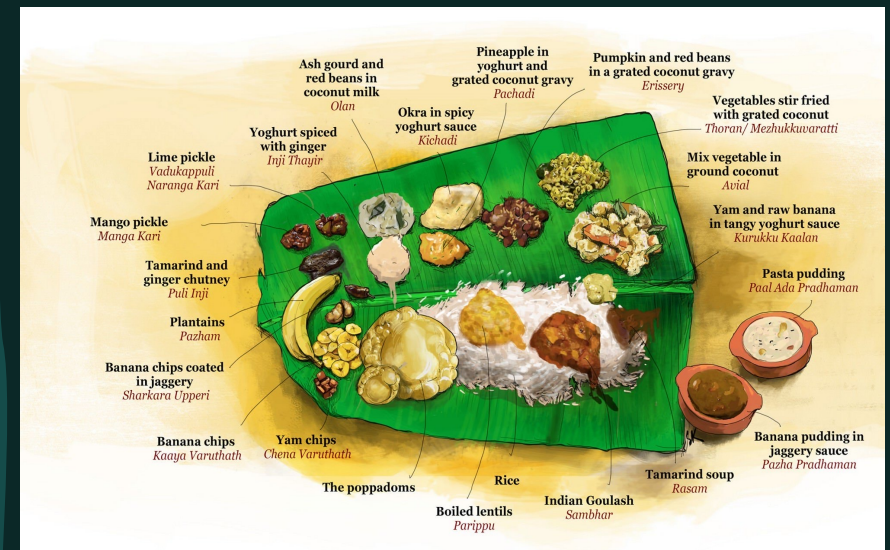


Dining at Tamil Weddings 101

- I understand that many will be unaware of Tamils and how their weddings are run. Here is a quick primer:
 1. Tamils are a specific ethnicity from the south of India, and they are native speakers of the Tamil language. There are significant Tamil populations not only in India but also Sri Lanka, Singapore, Malaysia and Canada.
 2. Tamil weddings have certain characteristics that have been consistent for centuries:
 - Buffet-style food is provided for breakfast, lunch or dinner (and sometimes at multiple mealtimes) depending on the time of the wedding ceremony
 - The meals tend to be usually vegetarian
 - Hospitality is a key feature of Tamil and Indian culture at-large. Therefore, it is imperative that food is readily offered to guests as a marker of respect and thanks for their blessings and presence.
 - Therefore, self-service style buffets are uncommon.
 - It is also "green/eco-friendly": Banana leaves are used as "plates" since they add aroma and flavor to the food. Banana leaves are biodegradable. Stainless-steel bowls and cups are preferred to plastic ones. These are washed and re-used.

Dining at Tamil Weddings 101

- On the right is a typical meal served at a Tamil wedding.
- The various food items have been labelled. These food items are served buffet-style and later guests can always request more of specific items.
- Further information on specific food items listed in the image can always be found via an online search.
- Note that for this DMAIC project, I have chosen to focus on the time it takes to clean and prepare the table until the serving of the first course of a typical wedding meal
 - The first course generally includes appetizers, vegetable side-dishes and bread



Define Phase: Business Case

- Current median cycle time to clean and prepare a row of eating tables* is **12 minutes 14 seconds** as of March 15, 2022.
- Our company's goal is to reach **7 minutes 30 seconds** by June 30, 2022 which is higher than the mean cycle time to prepare a row of tables of **9 minutes 15 seconds** in this industry (according to research conducted in December 2021).
- The mark of a good catering company is not only delicious food but also quick service!
- This will improve our standing and reputation in an increasingly-saturated wedding catering market.

* Please refer to the next slide for a detailed explanation of this

Define Phase: Business Case (Explanation)

- A row of eating tables is traditionally the method used at wedding ceremonies. Each of these rows can seat 20 people.



Define Phase: Problem Statement

- Current median cycle time for cleaning/preparing a row of tables at the Tamil weddings we cater to is 12 minutes 14 seconds as of March 15, 2022.
- This is significantly higher than the industry average of 9 minutes, which was measured in December 2021.
- Goal is to reduce this cycle time to 7 minutes 30 seconds by June 30, 2022.

Define Phase: Operational Definitions

- The cleaning time is measured as the time after the last guest leaves a row of eating tables which prompts a designated group of 3 servers to start clearing and cleaning the tables. The time ends when the banana leaves are set, water poured into cups and appetizers, breads and side-dishes, as part of the first course, have been placed on the banana leaves. This signals the guests to commence their meals.*

Step 1: Clear eaten banana leaves (folded) and paper table cover



Step 2: Lay new paper table cover



Step 3: Set clean banana leaves for each guest



Step 4: Serve first course of food (appetizers, side-dishes & bread on banana leaves)



* Note that another group of servers have responsibility for serving the main course (i.e., rice & curries), dessert and any refills for the guests

Measure Phase: Data Collection Plan

- The data collection plan is formulated using operational definitions and related conditions. The related conditions include number of seats at a given eating table and server type (Full-time or contract) and their time in the role.
- The sample set is chosen from a 3-hour window in day shift and night shift. All data will be recorded by using the Garmin r.485 stopwatch and La Crosse Technology C85845 thermometer

How many times did we exceed our target cycle time of 7 minutes and 30 seconds?					
Data		Operational Definitions & Procedures			
What	Measure Type/Measure Data	How is it measured?	Related conditions to record	Sampling Notes	How/Where recorded?
Waiting time for new set of dining guests	Cycle time (Minutes / Continuous Data)	The time (minutes) it takes for the servers to start clearing the table, disinfecting it and setting up the new table with first set of food items	<ul style="list-style-type: none"> - By time of day - By average server experience (withing group of 3) in catering business - Ambient temperature - No of hours since the group's last break 	Time study every wedding we cater to between the morning meal (6-9am) and afternoon meal (11-2pm)	Form on next slide

Measure Phase: Data Collection Form

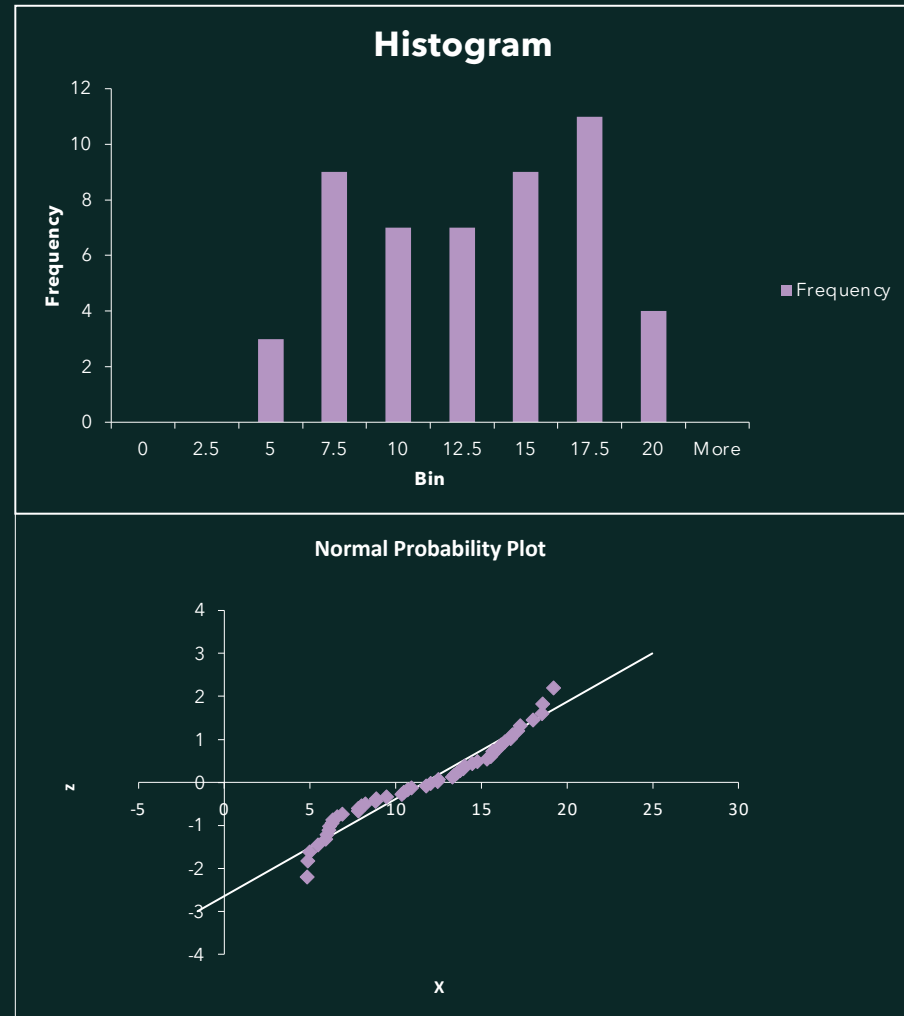
#	Y	X	X	X	X
	Cycle time	Time of Day	Average Server Experience	Ambient Room Temperature	Time since last break (hr)*
1	12:45	Afternoon	2.43	24.6°C	0.5
2	14:49	Morning	3.12	25.3°C	1.33
3	6:38	Afternoon	1.15	24.2°C	0.20
4	15:23	Morning	0.54	26.6°C	0
5	7:46	Morning	1.34	23.8°C	1.5

* Note that a break is defined as 10 or more minutes without being actively involved in tasks related to work. If the servers had no need to be cleaning/setting tables, they could enjoy their downtime and take breaks.

Measure Phase: Baseline Data & Situation (Testing Normality)

Average	11.7056
St Dev	4.42268
n	50
Median	12.24
S	-2550.45
AD	1.009
AD*	1.025
p Value	0.01069
Min	4.84
Max	19.2
<i>p Value Calculations</i>	
p	0.01069

- Our data **failed the Normality test** as the p-value was found to be less than 0.05.
- The Normal Probability Plot also seems to follow an S-Curve.
- Therefore, I used the median of the data (12.24 mins)



Measure Phase: How well are we doing currently?

Calculating Process Sigma: Method 2

1. Enter average, standard deviation, and spec limits

Enter	
Xbar	12.24
S	4.42
USL	15
LSL	
2.12 sigma	

2. Label a Normal curve

- Average
- Standard deviation
- USL (and shade to LEFT for Area 1)
- LSL (and shade to LEFT for Area 2)



5. Calculate Yield

$$\text{Yield} = \text{Area 1} - \text{Area 2} = \underline{\hspace{1cm}} - \underline{\hspace{1cm}} =$$

0.733828827

$$\text{Yield (percentage)} = \text{Yield} \times 100\% =$$

73.3828827%

6. Look up Yield in Process Sigma Table

Process Sigma = Look up in Sigma Table :

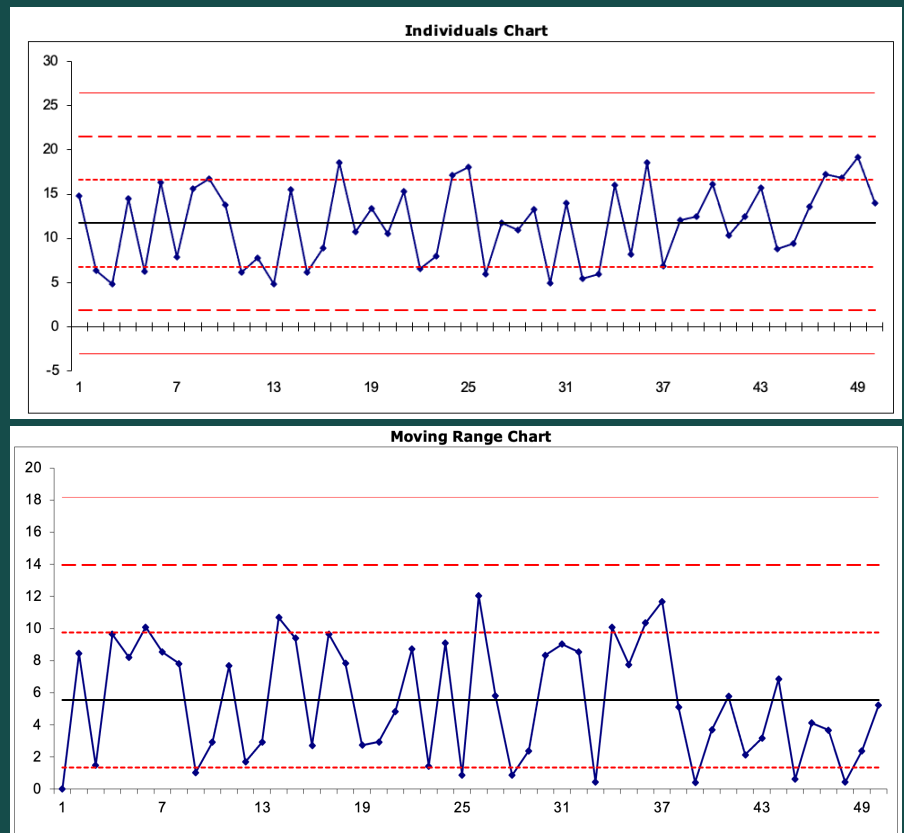
2.12

- Currently, only 73.38% of the cycle wait times were found to be lower than our goal of Upper Specification Limit (USL) of 15 minutes.
- The USL was deemed to be 15 minutes because the management believes that no customer should realistically be made to wait longer than 15 minutes for a table to be cleared and cleaned.
- The Process Sigma currently is **2.12**. There is considerable room for improvement here!

Measure Phase: Are we consistent?

Based on the Control charts, I believe this is a stable process that is not capable of achieving the goal of 7 minutes and 30 seconds cleaning time.

I will be analyzing some of the data points further, especially where the time taken was well above or below our target, to potentially generate some Xs for the Analyze phase.



Analyze Phase: Value Stream Map

- Server 1 removes all used banana leaves
- Server 2 removes the paper table cover
- Server 3 cleans the table and disinfects it
- Server 1 sets up the new paper table cover
- Server 2 sets me on the table on every seat (20 in total across each eating table)
- Servers 1 & 3 set drinking stainless-steel cups beside me and pour water into them
- Server 2 does quick inspection and if approved, calls the staff in the waiting room to allow the next batch of guests into the dining hall
- Guests start taking their seats
- Server 3 starts serving the appetizers and snacks
- Server 2 starts serving the vegetable side-dishes
- Server 1 starts serving the breads
- I am ready for consumption and the Guests start eating from me

Analyze Phase: Value Stream Map (Value-Added vs Non-Value Added)

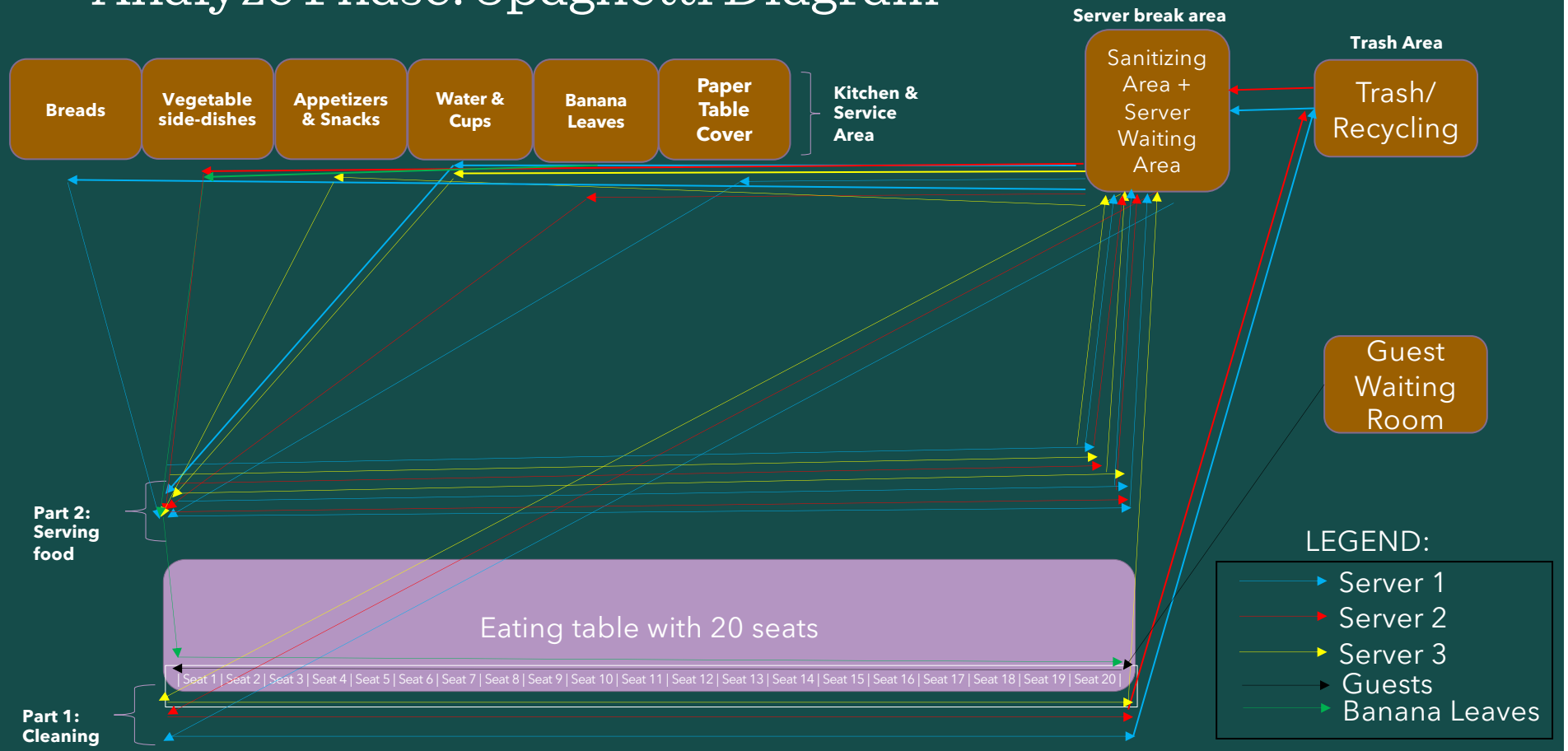
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- Server 2 does quick inspection and if approved, calls the staff in the waiting room to allow the next batch of guests into the dining hall
- Guests start taking their seats
- Server 3 starts serving the appetizers and snacks
- Server 2 starts serving the vegetable side-dishes
- Server 1 starts serving the breads
- I am ready for consumption and the Guests start eating from me

Note: Green = Value-added steps, Red = Non-value-added steps

Analyze Phase: SIPOC

Supplier	Inputs	Process	Outputs	Customer
Operations Department, HR Department	Server, Trash can, Cleaning cloth	After the final guest has left, Server 1 starts to remove each banana leaf and other items on the eating tables	Banana leaf with the first course of the meal on it with a cup of water on the side on a clean table that has been disinfected	Guests attending the Tamil wedding & wedding couple
Operations Department, HR Department	Server, Trash can	Server 2 starts to roll up the used paper table cover and throws it in the trash/recycling		
Operations Department, HR Department	Server, Cleaning equipment (spray, cloth, etc.)	Server 3 wipes down the table and disinfects it (Covid-19 measures)		
Operations Department, HR Department	Server, Table Cover Roll	Server 1 rolls out the new paper table cover across the entire eating table		
Kitchen, HR Department	Server, Banana Leaves	Server 2 sets clean banana leaves on each seat		
Kitchen, HR Department	Servers, Stainless-steel cups, Water	Servers 1 & 3 set stainless-steel cups and pour water into each of them		
Operations Department, HR Department	Servers, Walkie-Talkie	Server 2 does a quick inspection of each seat across the eating table and informs the staff in the waiting hall via walkie-talkie to allow the next 20 guests to enter the dining hall		
-	-	Guests start taking their seats		
Kitchen, HR Department	Server, Food	Server 3 starts serving the appetizers & snacks		
Kitchen, HR Department	Server, Food	Server 2 starts serving the vegetable side-dishes		
Kitchen, HR Department	Server, Food	Server 1 starts serving the breads		

Analyze Phase: Spaghetti Diagram



Analyze Phase: SIPOC /Value Stream/Spaghetti Diagram: Summary

- The SIPOC provided us with a high-level view of the process and its inputs and outputs. Furthermore, it provided details on the suppliers and customers of these inputs and outputs.
- The Value Stream helped identify wasteful processes that weren't adding value.
- Based on the Spaghetti Diagram, it is evident that the 3 servers that are part of a team in charge of cleaning and preparing the tables for the next set of diners have a lot of motion (based on LEAN principles). The motion (walking back and forth from the serving area is very wasteful and falls under the 8 Wastes of Lean Thinking that was discussed in this course.

Analyze Phase: Fishbone Diagram (Please use full-screen to view the image)



X1 – Multiple trips to/from kitchen/employee/trash areas to dining tables (LEAN Waste due to Motion) increases our Y (cycle time to clean)

- This was identified from the Spaghetti diagram, Process Map and SIPOC.
- As servers need to walk multiple times between the dining tables to the other areas of the dining hall (kitchen, employee and trash areas), it adds motion and as a result time to our cycle time to clean and prepare the tables.
- I have suggested Recommendations 1 & 3 (see related subsequent slides) to address X1.

X2 – Labor-intensive tasks impact us negatively due to existing high employee attrition. Hence, we sometimes lack manpower and that increases our Y (cycle time to clean)

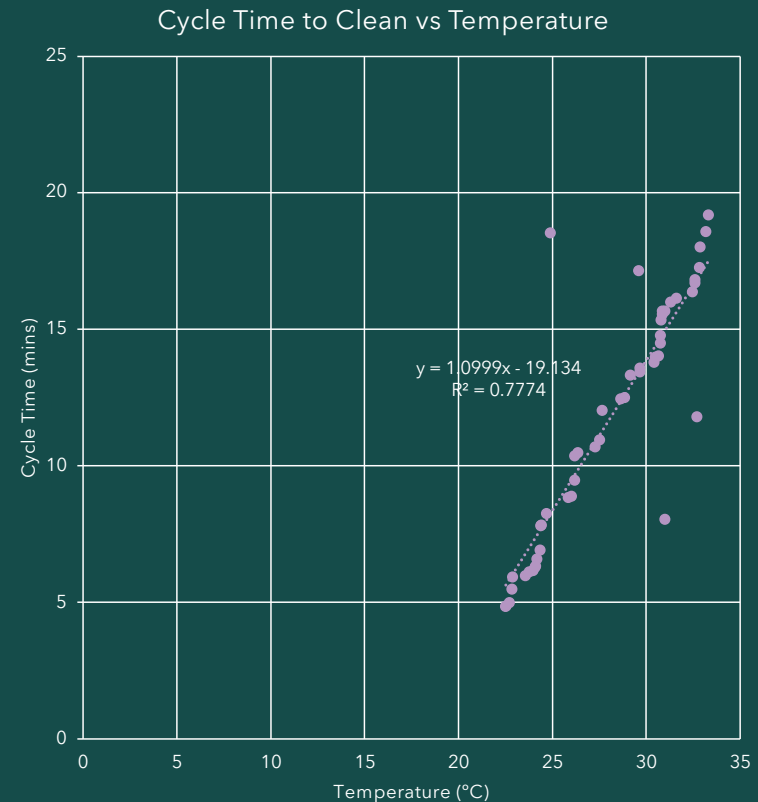
- This was identified from the Fishbone diagram which referred to existing employee data that 15% of servers quit each month. Furthermore, from the SIPOC and Process Map, it is evident that some of the processes are labor-intensive, which escalates our problem due to high employee attrition.
- Some of the tasks, such as ensuring tables are cleared and sanitized, currently demand 3 servers working in-tandem. Optimizing some of these tasks and enabling fewer servers to take on more roles would be ideal. (Lean 5S principles)
- I have suggested Recommendations 2, 3 and 5 to address this X.

X3 – Rework increases our Y (cycle time to clean)

- This was identified from the Fishbone diagram, SIPOC and Process Map. For instance, servers need to manually check each banana leaf when placing them on the table. This could have been completed by the employees who have procured and stored away banana leaves for each day's use. Similarly, food could go cold when it is left in the open without any lids, and this means we need to reheat the food (**rework**) or even throw it away.
- I have suggested Recommendation 3 address this X.

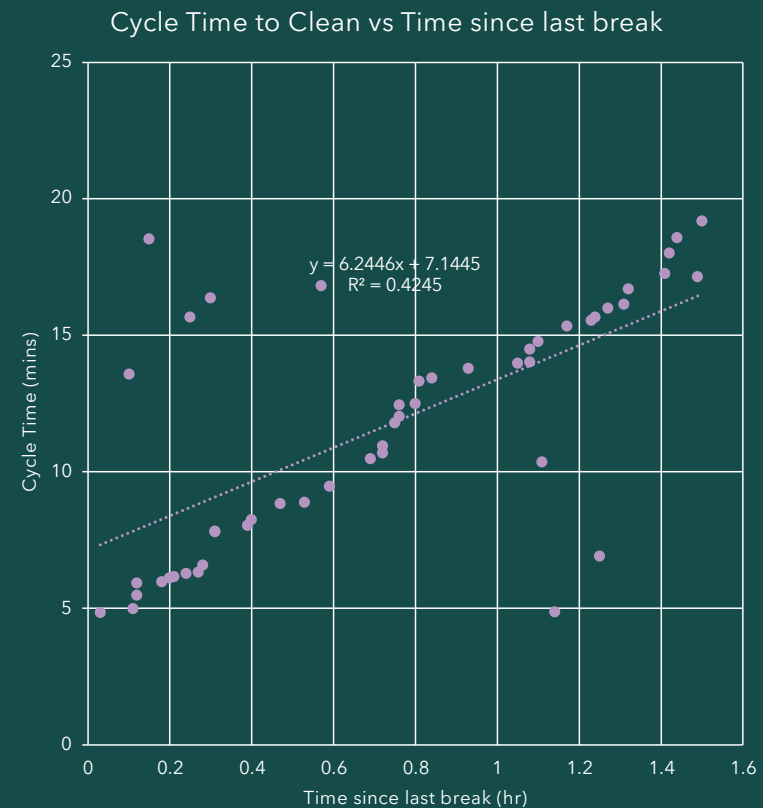
X4 – Higher ambient temperatures (hotter working conditions) increases our Y

- This was identified from the data collection where I noticed that as ambient temperature goes up, the Y generally increases too. (see graph)
- I have suggested Recommendation 4 address this X.



X5 – Fewer, less regular breaks for servers increases our Y

- This was identified from the data collection where I noticed that as time since last break goes up, the Y generally increases too. (see graph)
- To ensure that servers have more frequent (defined as 10 or more minutes away from work) I have suggested Recommendations 1, 2, 3, 4 and 5 to address this X.



Improve Phase: Recommendation 1. Utilizing a multi-purpose cleaning trolley

- To eliminate the wastes related to motion (X1), I recommended the use of multi-purpose cleaning trolleys. These trolleys would be fitted with a small trash receptacle to collect any trash and the used paper table cover.
- It will also carry all the necessary cleaning equipment and sprays to disinfect the tables after use.
- With the use of this trolley, it also reduces the need for 3 servers taking turns clearing, cleaning and setting the tables. **Just 2 servers are needed to do this now.** Given workforce attrition issues (X2), this can help reduce our company's need for servers.
- This optimization will also allow servers to get their job of clearing/setting tables quicker allowing some downtime for short breaks between cycles. (X5)
- This principle is tied with Lean 5S strategies of Sorting and Straightening. Currently, all cleaning-related items are kept in one corner of the room for servers' use (see bottom image). With trolleys, they now have all their necessary items without the need to pick and choose what they need before every shift.
- Furthermore, it will have a new roll of paper table cover that can be used after cleaning. Currently, rolls of paper table covers are in the kitchen. It would be more appropriate to keep them in this trolley and have spare rolls with other cleaning-related items. (5S - Sort)
- Lastly, by implementing the other 5S strategies of Standardize & Sustain, servers can ensure that cleaning supplies in their trolleys are replenished and replaced (if needed) at the end of every shift.



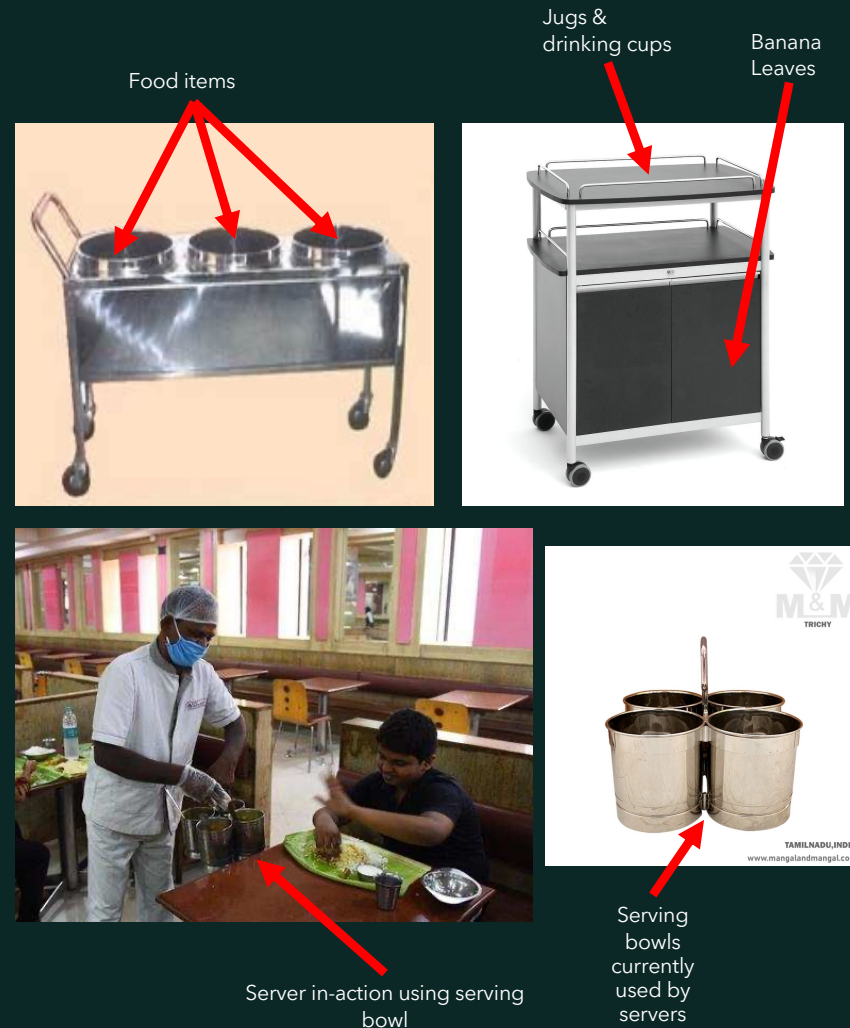
Improve Phase: Recommendation 2. Serving Jug for customers to dispense water themselves

- This recommendation addresses X2 and X5.
- Previously, a server would set a drinking cup for each guest and fill it up manually. This was tedious work and had to be repeated 20 times for each row of tables.
- This was a major factor in taking up precious time when setting the tables for the next set of guests.
- Now, servers would simply place a water jug for every 4th seat and empty drinking cups at each seat. Guests will now need to fill in their own drinking cups and this will ease time for our servers to perform other tasks.
- Similarly, this will allow servers to complete their tasks sooner and take short breaks between cycles (X5). It also reduces the labor-intensity of clearing/setting tables (X2).



Improve Phase: Recommendation 3. Utilizing a serving trolleys

- This addresses X1, X2, X3 and X5.
- The first trolley (top-left image) is adapted to serving Indian/Tamil cuisine. With multiple containers to hold Indian food items (such as vegetable side-dishes and appetizers), it can be customized to our needs while at the same time keeping the food hot.
- Previously, hand-held serving bowls common in the Tamil food catering business were used (bottom images - see red arrow). Servers had to lug these around by hand and due to its diminutive size, constant refills from the kitchen were needed, or even reheating since the food might have gone cold. (X1, X3)
- The second trolley (top-right image) allows the servers to reduce waste related to motion and place jugs, drinking cups and banana leaves in one go.
- These trolleys optimize servers to complete their jobs as efficiently as possible. It will reduce the need for our servers to go back and forth from the kitchen area to the dining tables multiple times. It also reduces the physical effort expended by our servers. (X2) They open some downtime for servers before they need to start their next cycle of clearing a row of tables. (X5)



Improve Phase: Recommendation 4. Permitting servers to wear face shields

- Since the onset of the Covid-19 pandemic, all servers have been required to wear face masks, except during breaks. This restricts breathing and given the hot workplace environment, it saps their energy very quickly.
- With various measures easing around the world, it might be best for us to trial face shields. These will allow greater breathing and comfort for our servers.
- Hence, this addresses X2 and X4 that were raised earlier.



Improve Phase: Recommendation 5.

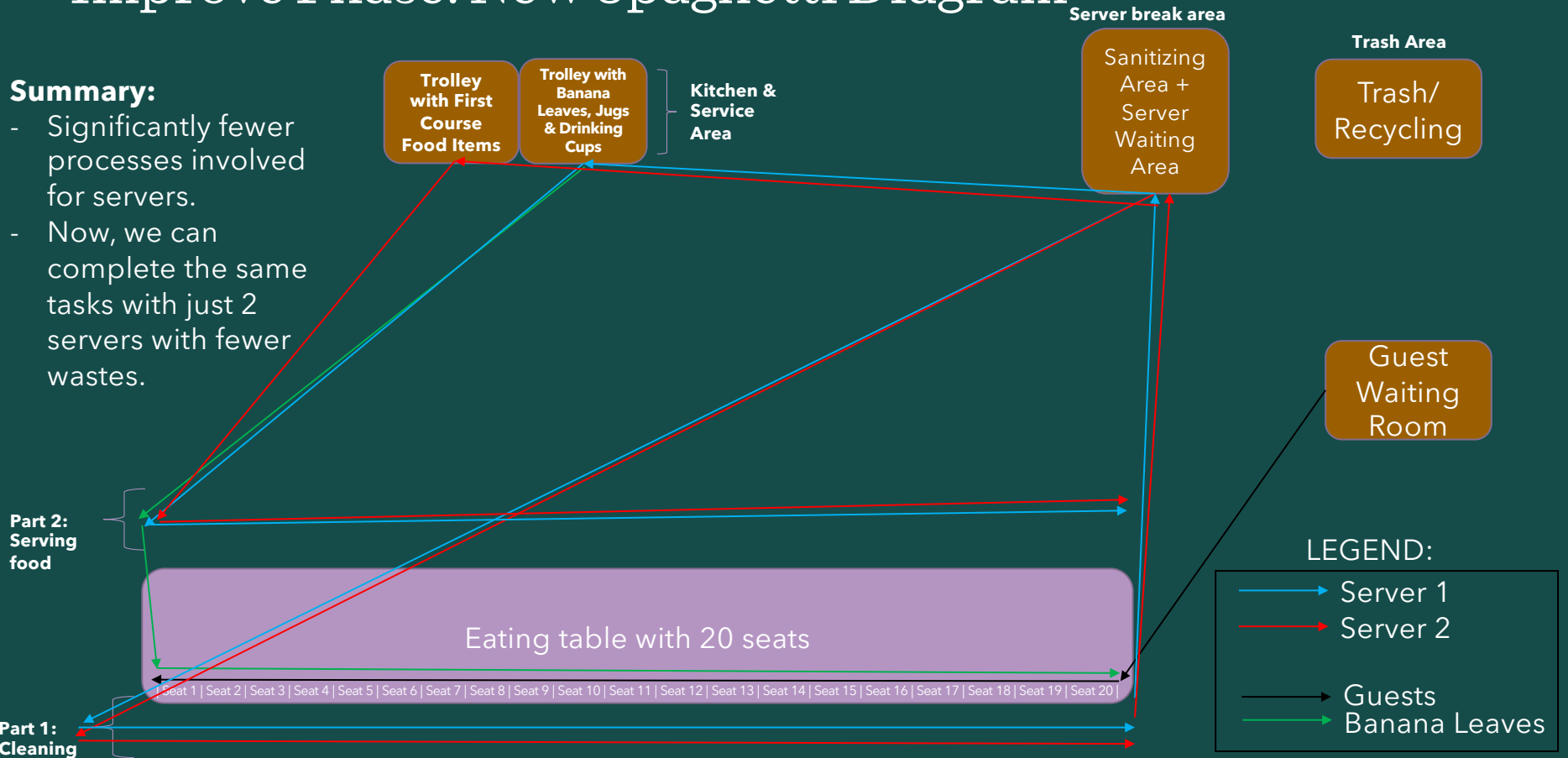
Create dedicated timeslot in the morning to prepare and segregate clean banana leaves for the entire day

- Banana leaves are bought from the wholesaler and used immediately without any verification for their quality. Servers must look out for any tears or damage to a banana leaf as they place it on the table. This adds time that was mentioned in X2.
- Therefore, I recommend creating dedicated time in the morning for a group of employees to look through the entire day's stock of banana leaves (depending on the wedding size, this could range from 200 to 500) and discarding any bad ones.
- This eliminates rework, and the servers can seamlessly place the banana leaf on the table and get on with their task. By allowing themselves to finish their work sooner, they will have more time between serving guests which increases the time they have to relax and have breaks, which was raised in X5.

Improve Phase: New Spaghetti Diagram

Summary:

- Significantly fewer processes involved for servers.
- Now, we can complete the same tasks with just 2 servers with fewer wastes.



Next Steps

- Next, as part of the DMAIC process, is the last portion of the Improve Phase & the entire Control Phase
- Here the following actions are to be taken:
 - Decide on solution(s) with entire team
 - Perform cost/benefit analysis of the solution(s)
 - Anticipate and mitigate any potential risks using the FMEA
 - Conduct a pilot of the solution(s)
 - Check to make sure there is an improvement to the cycle time
 - Mistake-proof the solution
 - Plan and execute full-scale implementation
 - Implement process control system (quality plan) to ensure process stays in control and we can quickly detect out-of-control state and determine the associated special causes

Conclusion

- The project started in February 2022 and five recommendations were suggested to the management team in April 2022.
- Upon completing the final part of the Improve Phase and the entirety of the Control Phase, we will be able to track the improvement statistics and metrics.
- The process currently operates at **2.12 sigma level**.
- Some of my key takeaways from this project are:
 - Able to identify Xs and make recommendations as part of the DMAIC approach
 - Able to utilize data to analyze and take objective decisions to improve the process
 - Able to utilize principles related to Lean, problem solving and 5S