



## CASE STUDY ON LITTLE BITE BAKERY PLANT

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### **Abstract**

*Little bite bakery is a plant organized by few workers initiated by left out from Big Bazaar super market bakery. Each workers have minimum experience of 1 year. This paper is a study of the arrangement of the process happening in the plant in concept with Job shop concept maintaining 5S concepts with six sigma and lean to reduce the muda's in the plant. Initially the plant does follow under layman concept of manufacturing. by implementing six sigma and lean process in the plant the entire defects were sorted out and the manufacturing time was drastically reduced. Thus by introducing a world class manufacturing concept.*

**Keywords:** *Muda, Six Sigma and Lean, 5s Concept.*

### **Introduction**

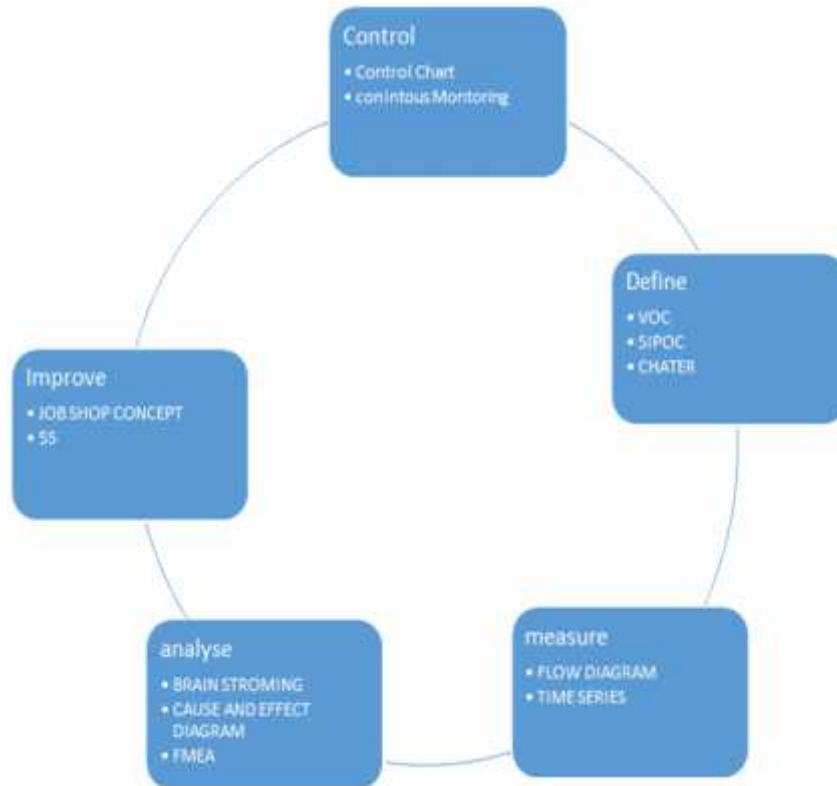
The little bite Bakery is located in Coimbatore City, India. This is a sheltered employment centre. The main products it produces are handmade bread, cakes, puffs and cookies.

The sales outlets for little bite Bakery in Coimbatore City are located at Kuniyamuthur. Because delivery times differ, operations are divided into three periods. The first period is from 4 A.m. to 10 A.m. when orders are received from nearby bakeries free delivery is made. The majority of these orders are for bread. The second period is from 8 A.m. to 12 P.m. Priority is for puffs preparation and delivery during this period. The third period is from 12 P.m. to 3 P.m. The primary work at this time is cookie & meal box packaging.

The operations performed during these three periods differ. Thus, the employees frequently forget where they have placed items during operation, or operation movement lines overlap, leading to disputes between the employees during work hours, which prevent them from concentrating on their jobs. Therefore, little bite Bakery in Coimbatore sought to use Lean Six Sigma to improve their production lines and methods and create an environment where the workers could work peacefully.

The figure shows the Lean Six Sigma architecture DMAIC used in this study. The goal of the definition stage was to establish project goals and ranges. This stage involves using SIPOC to analyse the supplier and customer, and collecting VOC for the customer.

The data is ultimately collated into a project charter. During the measurement stage, flowcharts and line graphs are primarily used to collect data within the range defined in the previous stage, organizing the data into problem points. In the analysis stage, brain storming, cause-and-effect diagrams, and Failure Mode and Effects Analysis (FMEA) are conducted to assess possible causes and analyse the priority improvement sequence. An improvement plan is formulated during the improvement stage. The control stage involves process control to ensure problems do not reoccur and to maintain operating standards.



## Application of Six Sigma in Lean

### 4.1 Define phase

The purpose of the define phase is to define the project goals and project charter. During this stage, SIPOC analysis is conducted considering the customer (C) perspective to determine which products or services satisfy customer requirements (O), which operating processes provide the products or services required by the customer (P), which resource provisions allow operating processes to create the required products or services smoothly and successfully (I), and where these required resources should be obtained (S). After using SIPOC analysis, the supplier and customer in all processes are understood and interviews are used to collect customer requirements. Improvement goals are sought to create a work environment that is more appropriate workers. The bakery expands its outlets with its products. After receiving orders from the bakery outlets, work orders are sent to the production and packaging departments. The production department prepares and manufactures based on the information in these work orders. The produced bread, cookies, and cakes are take more time in manufacturing. After analysing the SIPOC of Bakery, we interviewed the customer types derived from the SIPOC to collect the “voice of the customer” or customer opinions. We used quantitative descriptions

VOC can be used to understand the requirements of external and internal customers. The case company sought to improve manufacturing time problems. The employees in the Manufacturing department often struggled to obtain time management. Additionally, the operation movement lines were crowded.

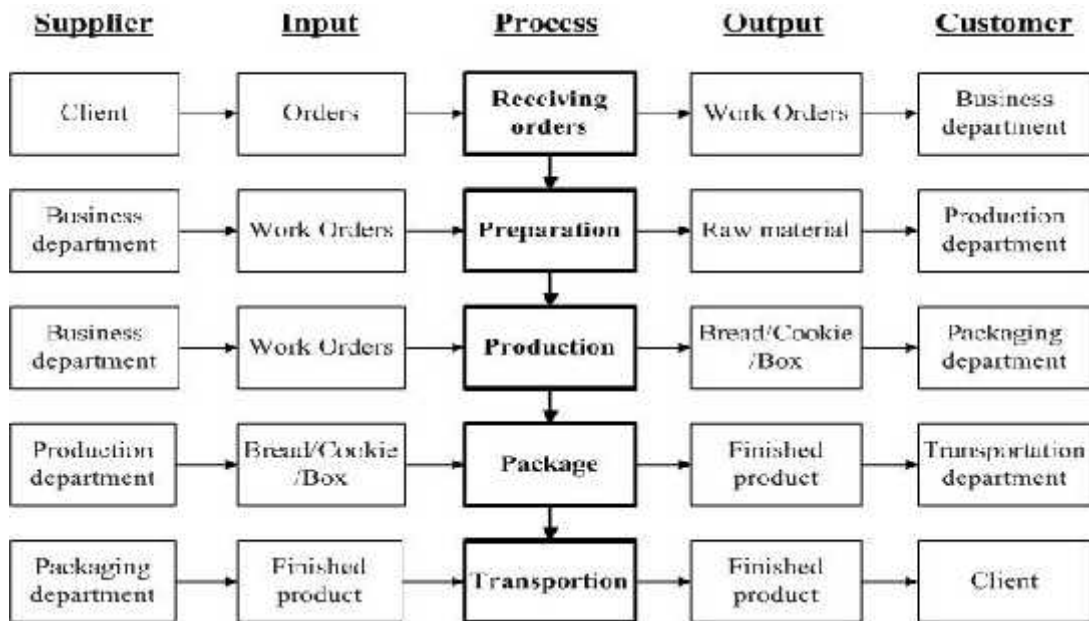
Thus, the employees affected each other during operations, preventing them from working with peace of mind. This eventually led to operational delays and uncertainty in shipping times, ultimately influencing delivery times.

To provide a good environment for the workers in the Manufacturing department, the improvement team analysed all the packaging processes and environments. The final goal was set as improving manufacturing time and objective measurement of improvements to effectiveness.

### Customer Opinions

Voice Source	Customer Type	Customer Voice	Customer Requirement	Process Output
Internal Customers	Manufacturing Department	When a substantial number of orders are Made, less workers are present, but Production process should be managed	When a substantial number of orders are made, more workers can be flexibly added or production Processes changed.	Production Process
Internal Customers	Manufacturing Department	Production Time are difficult to obtain and the movement Line is congested.	Assist the Working smoothly.	Manufacturing Time
Internal Customers	Shipment Area	Shipping time is difficult to understand or control.	Reduce the uncertainty of shipping times.	Shipping Time
External Customers	Product Customers	Delivery times are often delayed.	A delivery time error of $\pm 10$ min.	Delivery Time

### SIPOC Chart:



### Measure Phase

The goal of the measure phase was to collect data and clarify related situations in the work process to facilitate the assessment of the root causes of problems during the next stage. For this case study, we created a packaging flowchart and measured and illustrated the site layout and movement line diagram on site to allow all of the project members to clearly understand the packaging processes and environments. This was to facilitate later analysis

Operating Period	Operations Content	Problem Areas
Period 1 (4:00 to 8:00)	Blending Die filling baking packaging and tying	1. Operating combinations in each period are complex. The movement lines of different operating processes overlap, causing aisle blockages and creating friction during operations. 2. Packaging materials are difficult to retrieve from the cabinets. Products and materials have no fixed positions, making them difficult to locate and obtain. 3. When packaging meal boxes, aisles become congested with the placement of workbenches for the bread, and traversing the aisles becomes impossible. 4. If numerous types of dishes are packaged at the same time.
Period 2 (8:00to 9:00)	Dispatch of breads puffs manufacturing Puffs filling	
Period 3 (12:00 to 15:00)	Dispatch and cookie manufacturing	

### Analyse Phase

The goal of the analysis phase is to analyze the primary causes of the problems in the packaging process. This case used brain storming as a starting point. We first compiled a selection list of the causes of all of the problem points. This list was gradually refined, and the possible causes were classified to produce cause-and-effect diagrams. The other causes were linked as if in a structure tree to assist the employees in considering all possible causes and making informed assumptions. After considering all possible causes, we used FMEA to assess improvement priority sequence for the possible causes.

Based on the FMEA assessment criteria published by the U.S. Automotive Industry Action Group (AIAG), we sought risk priority number (RPN) levels to assist in testing the severity level of failures and the processing priority sequence.

RPN is the product of the degree of severity (S), frequency of occurrence (O), and chance of detection (D).

1. Degree of severity (S): The amount to which failures affect operations and may threaten workers (machines). This aspect was scored from 1 to 10, with 1 denoting no clear influence or mild inconvenience to operations or workers and 10 denoting the possibility that workers or machines may be damaged without warning.
2. Frequency of occurrence (O): The probability of a certain cause of failure occurring. This aspect was scored from 1 to 10, with 1 denoting never occurring and 10 denoting occurring daily.

Chance of detection (D): Whether the occurrence of the failure can be detected. This aspect was scored from 1 to 10, with 1 denoting definitely can be detected in current operations and 10 denoting cannot be detected.

### Improve Phase

The cause analysis was used to identify the key factors influencing process output changes. Improvement measures were then implemented for the key factors during the improvement stage. During the improve phase the entire layout of the factory is plotted in the chart, all the manufacturing process is mapped in the chart, the process of the bread manufacturing and puff manufacturing is plotted in the chart.

Chart -1 Shows the Manufacturing of Bread

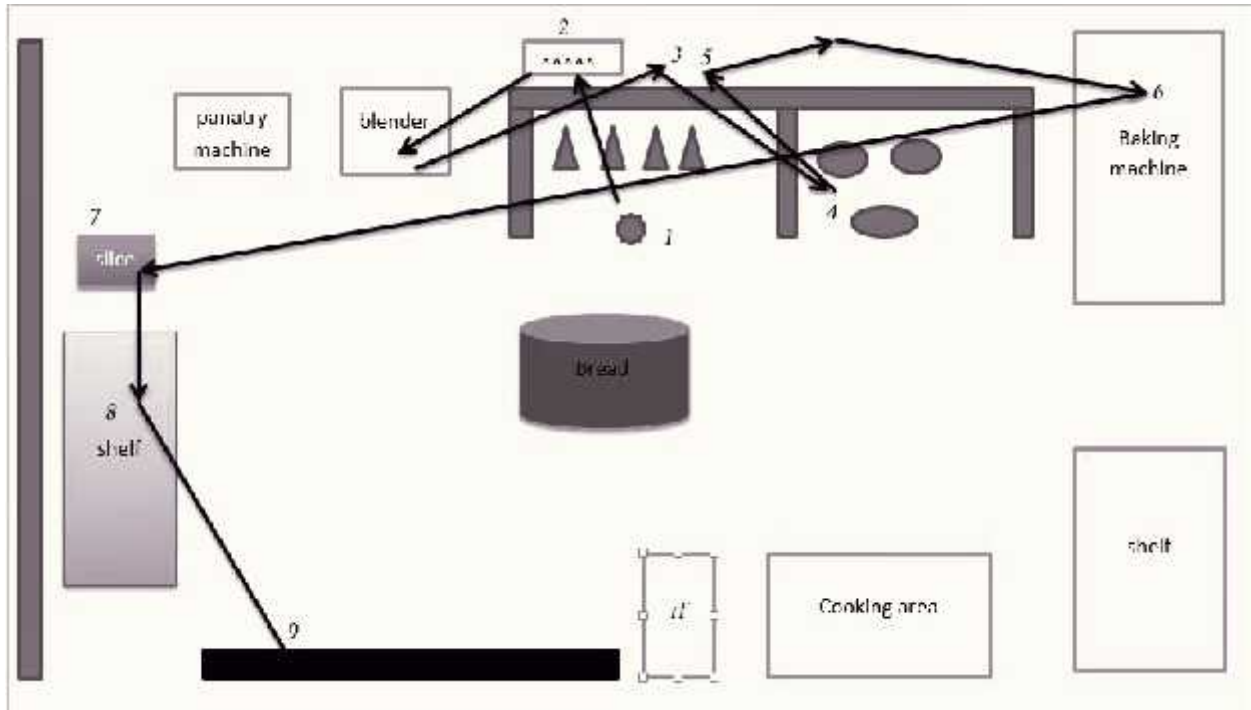


Chart -2 Shows the Manufacturing of Puff

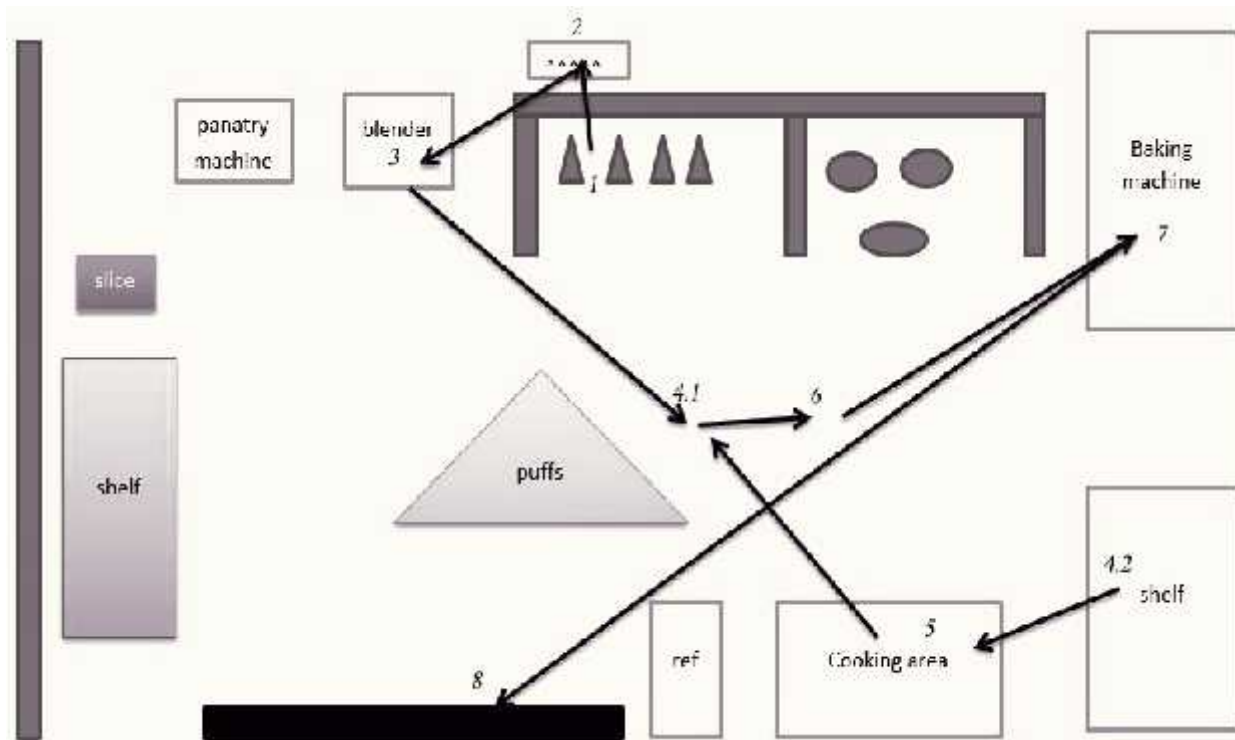
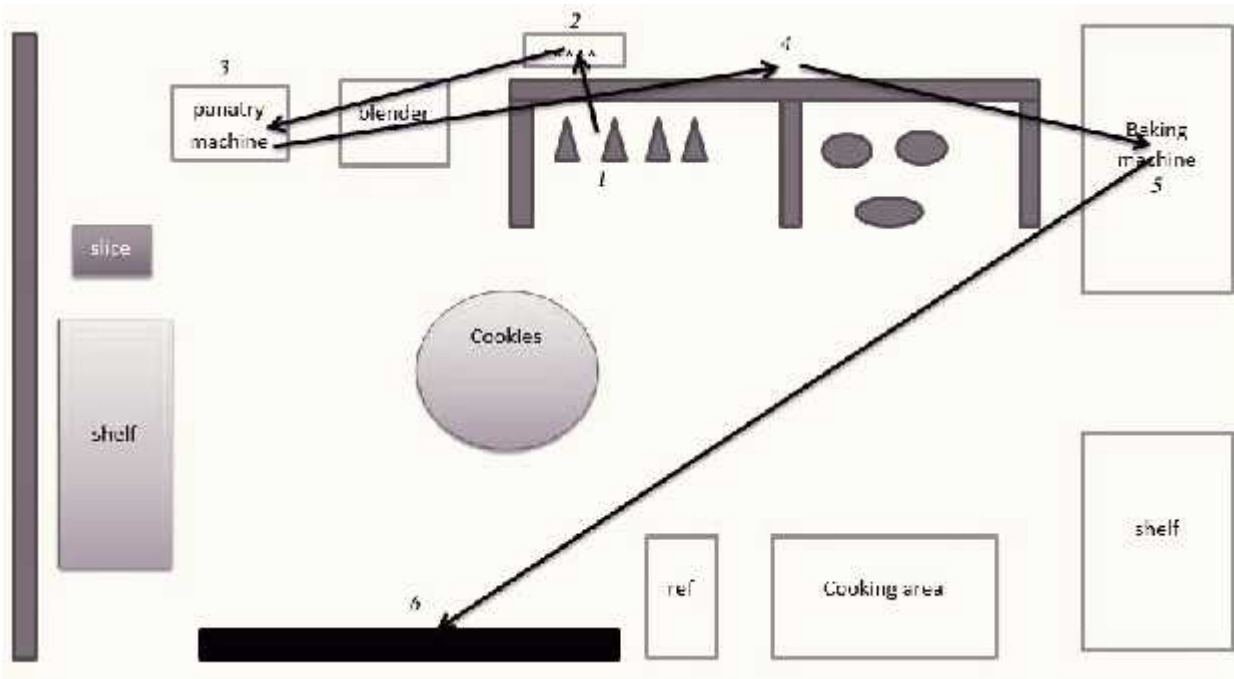
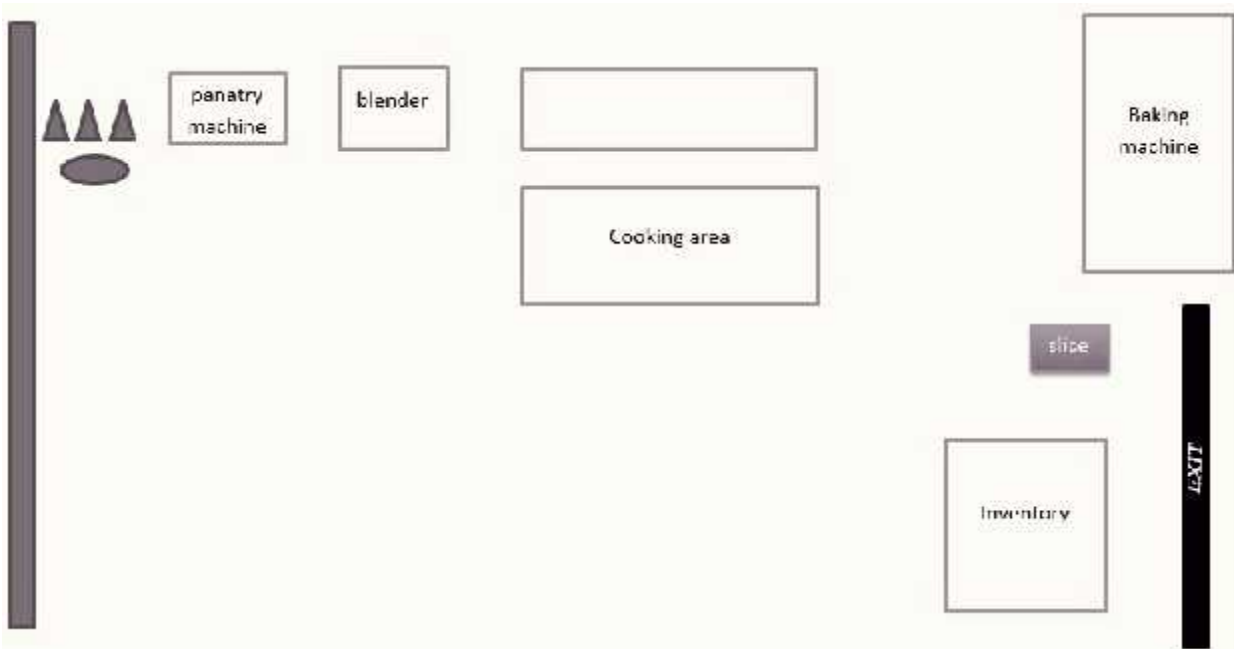


Chart- 3 Shows the Manufacturing of Cookies



After Implementing 5s Concepts the Final View of the Renovated Plant



### Control Phase

The goal of the control phase was to stabilize the improvement effects explained previously and avoid a sudden return to old habits and processes. Before finishing work, and to supplement the required amounts to reduce the time spent supplying packaging materials during work hours. Clear text or photographs were used to label the



cabinets to ensure the employees could to directly determine which packaging material they should take.

The equipment in the packaging area was clearly marked with colour tape on the ground to indicate the placement area and prevent hazards or danger.

#### Comparison of operation times before and after improvements

Period	Content	Before (Time)	After (Time)	%
Period 1 (8:00~10:00)	Bread manufacturing	101.6s	93s	9.2%
	Bread packaging and tying	379.81s	312.99s	21%
Period 2 (10:00~12:00)	puffs packaging	59.66s	50s	19%
	Puffs packaging	298.3s	212s	40%
	cookies manufacturing	841.91s	780.13s	8%
Period 3 (12:00~15:00)	Cookies packaging	732.9s	664s	10%

#### Conclusion

Lean Six Sigma methods are generally implemented in the manufacturing industry. Specifically, no previous studies have applied these methods to the workshops of organizations. In this study, we established that Lean Six Sigma can be applied workshops to assist them in comprehensively planning environments appropriate for employees.

Sheltered workshops must spend time coaching or guiding workers, arranging assistive devices, and supplementing other human resource accommodation or installation to make the work environment design consistent with work content for employees work abilities, thereby reducing their work burdens. However, providing guidance to each disabled person with different requirements can occasionally decrease an organizations ability to comprehensively consider the influence of the overall environment. In this study, we used Lean Six Sigma methods to improve the bakery or factory layout and cabinet design, increasing space usage rates and reducing the friction between employees during working hours. We used visual management to remind the workers of the location of the packaging material and when replenishment was necessary.