

Six sigma for pizza

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Introduction

Yum Yum Pizza group comprises 10 pizza shops scattering in different areas in Hong Kong Island, Kowloon, and New Territory as shown on the map below. Staff in each shop are basically organized with order receptionist, baker, and delivery workers. On top of these 10 pizza shops, the leadership and management works are responsible for a management team. The core business is to produce pizza of various styles and deliver to their customers according to the address of the order by phone. Of course, there is also self-pickup pizza available to the customers. However, this is merely involved about 10% of the overall business.

Shop Location Starting from early 2003, there was occasional customer feedbacks and complaints which were mainly involved in unpunctual delivery of pizza. Since 90% of the business required our pizza delivery, the management began to pay attention to this feedback. During the half-year review in June 2003, it was discovered about 3% loss of customers and about a 5% drop in pizza sales in the same period. We immediately communicated the finding with the Management. Subsequently, a project team was set up to investigate the causes and seek improvement in the situation. After the first. Report of SiX Sigma Project, Yum Yum Pizza Group Page 3 of 23 project team meeting, it was agreed that the team would adopt Six Sigma strategy to determine the cause of the problem and implement the solution. The purpose of this report is to present the results of the pizza group's problem-solving process and explain the solution adopted. As Six Sigma problem-solving includes statistical and measurement methods, by using the stools, we focused the efforts on understanding the variations in the business

process and the defects that result: Customer satisfaction Revenue Quality Impact to employees Growth of business Competitive advantages.

This report also presents a detailed explanation of steps on how we used the six sigma problem-solving strategy (i. e define, measure analysis, improve and control) to determine the cause of losing customer, decreasing of pizza sales and to establish the method in rectifying the faulty steps in our operation process. Lastly, with the implementation of the fine-tuned process, the reoccurrence of the defects can be minimized in order to maintain and enhance a sound pizza business operation. Define Phase To the current practice, the time required for the delivery of a pizza to the customer was one hour on average. With concern on the customer complaints on unpunctual delivery, sales decreasing and the number of customers was found reduced in the 6-months financial review in June 2003, undoubtedly, the pizza group had to take action to rectify the situation. In the beginning, we did not know what particular problem being existed in the business. A project team was therefore set up, by using six sigma strategy to tackle and rectify the problem.

Opportunity Statement Current average delivery time is one hour for each We currently have an average delivery of pizza/pizzas to customers.

Management delivery cycle of one hour. requires the pizza to be delivered within one hour as declared by the same scales competitors in this trade of Our customers expect the business. pizza can be delivered Yum Yum Pizza group have been losing 3% of punctually within +/- 5 min. customers base per month within the past 6 months variation review, the sales have dropped

by 5% (HKD135K per month) for the same period. By improving the accurate delivery time we anticipate the loss of customers would be merely a 1% drop and the sale would also be returned to about a 2% drop. With continuous implementation, the pizza sales would have a 3% to 5% further increase monthly (i. e. \$81K/month - \$135K/month increase) in the coming one or two years. Goal Statement -To deliver pizza from order to customer within one hour punctually - To achieve pizza delivery time within +/- 5 min. - Since this is the first six sigma project in Yum Yum Pizza Group, the current sigma process level is unknown which has to be identified and improved as the target of the project team.

Pizza in customer's hand Team Selection Bob Black Belt Charles Group Manager Apple Order Receptionist Donald Baker Edward Deliveryman The project team charter submitted to management and was approved in mid-May 2003. Right immediately, a brainstorming session conducted to review the business. SIPOC diagram was also established with identification on Supplier, Inputs, Process, Outputs Customers for showing the current situation of the business process and is now as below:

- Requirements
- Ingredients for Pizza
- Packaging material supplier
- Supplier for motorcycle
- Printing Company Process
- Ingredients
- Packaging materials

- Staff
- Motorcycles
- Order form See below
- Pizza Office customers Household customers
- Delicious
- Good taste
- Punctual delivery

1. Step 1 Receive Order (by phone)

2. Step 2 Production & Packaging

3. Step 3 Motorcycle Delivery

4. Step 4 Park & arrive at a delivery point

5. Step 5 Hand in pizza to Customer & receive money

Report of Six Sigma Project, Yum Yum Pizza Group Page 7 of 23 Besides, customer surveys were also conducted to collect the impression and feedback from customers. With these “ Voice Of Customers” (VOC), we firstly developed a list of key customer issues.

Voice of Customer to Critical Customer Requirement (VOC to CCR) Critical Customer Requirement maintain pizza at temperature 40 degrees C when passing to customer inform arrival time and price in advance Key Customer Issue pizza delivered to the customer should be at the reasonable temperature on-time delivery packing arrangement concern on price Voice of Customer Cool pizza, tasted no good Late delivery Long deliver lead time Poor packaging outlook Poor packaging spoil pizza unexpected high price impolite delivery manner ragged deliver worker keep arrival time variation less than 5 min. standard pizza package standard greeting and manner

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delivery worker in uniform need polite manner when passing pizza to customer reasonable worker outlook - Measure Phase To investigate and realize further improvement for fulfilling the most important requirement from customers, it was anticipated operational definition would be essential to clearly point out the criteria to our operational performance. Based on the current operation process and the established operational definition, we conducted surveys and interviews with our customers and staff to collect data on how we performed currently.

Below is the table showing our data measurement plan which was designed to collect the feedbacks and opinions. As indicated, the data were collected from various sources, that included the direct feedback from the customer, and we anticipated the right moment to collect these data should be right after the telephone order from customers, which was the most simple and direct method to collect the first-hand information. How will data be selected? Other data should be collected at the same time? -feedback from the customer, -feedback from the delivery worker, 15% of delivered pizza 1 June to 30 June Randomly Pizza quality, Bob, Black Belt -telephone, survey/questionnaire ox with thermal indicator and ensure the temperature is not less than 40 degrees C on the indicator -estimate delivery time and price of a pizza, then inform the customer on the arrival time right after telephone order -ride a motorcycle for pizza delivery and arrive on time - packaging pizza with standard cartoon box -greeting to the customer with the wording -the delivery worker must be wearing clean and tidy uniform standard C when passing to customer -measure the failure rate in informing arrival time and price in advance to customer -measure the failure rate in

keeping arrival time variation less than 5 min. measure the failure rate in packaging pizza in the standard package -measure the failure rate of delivery worker greeting to the customer by saying standard greeting and manner -measure the failure rate of a delivery worker wearing uniform selected.

Order by phone standard greeting, listen customer's order details produce and bake pizza as ordered confirm order details and customer address and delivery route confirm delivery time, payment package pizza in delivery box collect packaged pizza or other food items plan for production schedule put pizza and other items into a delivery box of motorcycle drive to customer address get to the door of the address, ring the bell and say standard greeting check acceptance and pay to confirm delivery of pizza and other food items receive payment and customer signature on receipt, say standard goodbye and leave business case completed.

According to the established operation definition and sequence above, survey forms and questionnaires were formulated. It was also decided to perform the 500 surveys to customers randomly starting from 1 June. 2003, that involved about 15% of the pizza business during the moment. In addition to the questions devised from operation definitions, some general questions like “ Do you think the choice of the pizzas is sufficient to you “ and “ Can you find your favorite taste among the existing available choice of pizzas “ were also included in the questionnaires and survey questions to customers.

Below is the table summarizing the survey results: Summary of operation defects as identified in June 2003 survey Satisfactory Defect item Operation description level.

Frequency not acceptable:

1. maintain pizza not less than 40 degrees C not acceptable
2. advise pizza arrival time not acceptable
3. variations of pizza arrival time within 5 min. acceptable
4. acceptable pizza package acceptable
5. delivery worker wearing a uniform
6. acceptable greeting words from delivery worker acceptable
7. do you think the choice of the pizzas is sufficient to you good? can you find your favor us taste among the existing?
8. available choice of pizzas very good good
9. waiting time during telephone order for pizza 10 clear
telephonercommunicationwith order reception very good.

Analysis Phase.

In the analysis phase, we had studied why all the pizza delivery to the customer could not be achieved steadily within one hour. The failure rates are the highest of 46. 88% of all defects identified and it happened 45 times during the survey period with a sample size of 500 surveys. With the further investigation on the finding, we found the traffic condition, weather condition, and the familiarity of the delivery worker to the customer address would highly affect the overall delivery time and therefore giving a “ Not Punctual Impression” to the customer.

In addition, such delay would also be caused the pizza temperature to drop below the designed 40 degrees C. As a result, the number of customers decreased and pizza sales dropped. Below was the Cause-and-Effect diagram utilized for analyzing causes leading to delayed delivery. Cause-and-effect Diagram - Pizza Delivery People poor communication Machines Telephone Traffic Condition Traffic Jam Pizza Oven delivers not familiar with customer's address Road excavation Motorcycle Operation process Not Punctual Pizza Delivery Typhoon kills of baking by Pizza Oven Driving Skill on Motorcycle Raining delivery box on a motorcycle.

Cartoon box for packing pizza Methods Weather Materials For the pizza temperature, we investigated the delivery box on motorcycles and cartoon boxes currently used in packaging pizzas for delivery. No major problem was found in keeping pizza exist oven temperature. Actually, the material for keeping warm, that included delivery boxes on motorcycles and cartoon boxes, all these equipment and facilities were at an acceptable quality standard and in a sound condition.

Motorcycle kill of baking by Pizza Oven driving skill of Motorcycle delivery box on motorcycle Cartoon box for packing pizza Pizza Temperature below 40 degrees C Methods Materials Analysis on other issues were also conducted, which mainly carried out with reference on the operation process, starting from customer order to the payment received from the customer. In addition to the analysis of the collected data, FMEA was also a tool to study recommended improvement action. The purpose was to had a thorough understanding of the internal strength and weaknesses of Yum

Yum Pizza Group. Below was the quality function deployment matrix utilized for the analysis. As indicated in the diagram, the highest score of 27 was found on “ Keep arrival time variation less than 5 minutes “. That meant it should be the first issue to be resolved for improving the pizza business

Quality Function deployment Matrix VS: Very strong relationship w w

Thermal sensing tape w w Good knowledge of road condition and driving skill

S: Strong relationship W: Weak relationship VS Well equipped pizza bakery

Communication tools Manner training Cartoon pizza box Good baking skill

Technical requirement Good conditioned motorcycle Accurate watch Tidy

uniform CCR Pizza at temperature 40 degrees to customer Inform arrival

time & price in advance Keep arrival time variation less than 5 minutes

Standard pizza package Standard greeting and polite manner Proper dressed

delivery worker. Based on the analyzed information, the project team

understood that the methodology, facilities, and including the operation

behavior of staff are at an acceptable level. The most serious and

uncontrollable factor is the traffic or road condition and weather situation,

which was mostly a serious item affecting the arrival time of pizza to the

customer. To minimize this factor, the Project Team recommended the entire

service areas of the Pizza Group to be separated into 10 services zones.

And each shop would response to serve the pizza customers' within the

defined zone. Should there was any order outside their responsible zone, the

order receptionist had to refer the orders to the responsible shop to produce

and deliver the pizza by their own resources. However, whenever there was

any order outside all the 10 service zone as shown on the map of the

responsible zone, the receptionist had to estimate the delivery time and immediately explain to the customer for the estimated time required. Even the delivery time would exceed the pre-designed one hour delivery period, with this clarification the customer would understand the situation without the wrong expectation on the pizza delivery. As such, complaints on unpunctual pizza delivery should be kept to the minimum. Below were the modified operation process chart with the changes marked in brown and the map showing the responsible service zones of the 10 pizza shop for reference.

Customer Order Receptionist Order Receptionist of responsible area Baker Deliver Order by phone standard greeting, listen customer's order details confirm order details and customer address confirm delivery time, payment Plan for production schedule produce and bake pizza as ordered plan delivery route pack pizza in delivery box collect packed pizza or other food items

Review for production area put pizza and other items into a delivery box of motorcycle continue pizza production locally drive to customer address get to the door of the address, ring the bell and say standard greeting check acceptance and pay to confirm delivery of pizza and other food items receive payment and customer signature on receipt, say standard goodbye and leave business case completed. The chart could distinguish the process variation resulting from common causes or special causes. It was aware that variation in the pizza operation was unavoidable. A number of factors including material, machines, methods, environment, and operators were the major elements causing variation. For easily reflecting and controlling the

overall performance of the pizza delivery, X-bar & R chart was selected for monitoring and controlling purposes.

Operation description maintains pizza not less than 40 degrees C advise pizza arrival time variation of pizza arrival time within 5 min. acceptable pizza package delivery worker wearing uniform acceptable greeting words from delivery worker Conclusion Even though it was not 100% rectified all the operation defects, with the great improvement on the pizza delivery, the defect rate on pizza temperature was also improved. The sigma value on the overall pizza delivery of the group was greatly improved to 1.5 sigma and the pizza sales as reviewed in end Dec. 2003, 5% increased was identified in comparison with the sales figure six months before.