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Case Study

Six-sigma methodology: its role in measuring and improving customer satisfaction at Alnoran Hotel, Libya

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Abstract

The main objective of the thesis is to assess and improve the customer satisfaction at Alnoran hotel in Benghazi city. In other words, this study has two specific objectives; Measuring the level of guests' satisfaction in the areas of front office and housekeeping and identifying potential improvement processes that would enhance the service level. To achieve the objectives of this study, Six-Sigma methodology has been applied which provides a structured approach to solve problems. The approach has five phases; Define, Measure, Analyze, Improve and Control (DMAIC). Initially, the data were collected based on interviews with both employees and guests. Additionally, a questionnaire was conducted to elicit reliable responses from the guests. Relevant literature was studied to get a deeper understanding of the problem. Some of the literature is summarized in the theory part of the study. The results of the case study presented recommendations for the hotel management to improve the service level. Finally, quality do not get much interest at Libyan service sector, even though the methodology has been successfully used globally. It is expected that the study would encourage other organizations in local area to adopt this study as a guideline in order to enhance the quality of service.

Keywords: Quality improvement, Six Sigma, customer satisfaction, Starwood.

Introduction

Providing and retain customer satisfaction is one of the most important concerns of modern management particularly in the service industries. Quality of service and customer satisfaction are key factors in the battle for increased competitiveness.

Due to the tremendous success of Six-Sigma, many customer-oriented service industries have begun to improve service quality by applying the Six-Sigma methodology. Which now plays a strategic role in winning businesses and running organizations. To keep and raise standards of service[1].

In the service industry, Six-Sigma provides several advantages such as enhancing knowledge of the customer's requirements and expectations as well as the employees' satisfaction. The belief that Six-Sigma should only be used to solve problems that arise in manufacturing companies needs to be demystified, as this tool is highly effective when used in the service organizations[2]. Starwood Hotels and Resorts one of the largest hotel chains was embraced Six-Sigma. In 2001 Starwood adopted the method to develop innovative, customer-focused solutions and to transfer these solutions throughout the global organization. It's also extremely adaptable; since its introduction at Starwood, it has refined dramatically to reflect the focus on service quality and satisfying the voice of the customer. It stands to reason that studying Starwood and its Six-Sigma activities would provide an opportunity to critically analyze Six-Sigma implementation in a different type of service organization and learn from its experiences[3].

In this research, a study is performed on the assess an extent to which the service that provided by front offices and housekeeping have met the customer needs. In addition to that, identify potential improvements to increase satisfaction level in order to promote their position in local competition. The study was implemented at Alnoran hotel with three stars, one of the largest hotels in Benghazi, Libya.

Literature Review

After initial success in healthcare and banking, the concept of Six-Sigma has become popular in service organisations. It has gradually gained traction in other types of service industries, including hotels.

Antony states that Six-Sigma now applies more and more to a multitude of processes ranging from manufacturing to service and varied transactional processes. He reported the essential ingredients which are required for the successful deployment of Six-Sigma in the service sector[4]. More recently, Six-Sigma methodology along with quality improvement techniques and tools have been used in hospitality and service sector[5-7].

In the area of customer satisfaction, there are many studies that covered this subject, Su focused on hotel guest comment cards and customer satisfaction management schemes in Taiwan. Results show that no single hotel evaluated within that study's survey sample meets all listed best practice standards. It is suggested that the hotel sector in Taiwan re-examine its method to assess customer satisfaction with the objective of attaining conformity to all critical best practice criteria[8]. Kangogo et al. tried to find out the impact of customer satisfaction in the hotel industry and suggested some convenient hotel strategies that could improve customer satisfaction[9]. Mohajerani and Miremadi contributed to submit a paper aimed to identify the relationship between customer satisfaction as a dependent variable with other independent variables such as client expectations, quality of service, perceived value, location, and complaining behaviour. The second objective was to suggest a model of customer satisfaction for the hotel sector in Kish Island, Iran[10].

Starwood Hotels and Resorts one of the largest hotel chains was embraced Six-Sigma. In 2001 Starwood adopted the method to develop innovative, customer-focused solutions and to transfer these solutions throughout the global organization[11]. Ahmed gave a thorough study about significance and impact of training through Six-Sigma in hotels. He explored how the hotel industry can use a systematic and disciplined approach to fulfill excellence in customer satisfaction[12]. Abou Kamar presented a study attempted to evaluate the effectiveness of Six-Sigma and examine its impacts on multiple performance measures of luxury hotels in Egypt, seeking the values and advantages it brings to develop the overall performance. The results stated that the application of Six-Sigma is positively and substantially related to the operational and competitive performance of hotels. Also, Hotels carrying out Six-Sigma have acquired more benefits as compared to other hotels implementing other quality management programs[13].

Methodology

Six-Sigma concept will be utilized to boost the quality of service provided in Alnoran hotel; particularly in front office and housekeeping department. Project team emphasizes on the effective role of this enhancement on how the customers rate this hotel. However, DMAIC methodology will be used to achieve the goal of the study as in Figure-1, each phase or step has its own tools and clear objectives. Furthermore, a collection of data relies on questionnaires and personal interviews with the guests. A questionnaire comprises of a list of questions (structured and unstructured) compiled to obtain reliable answers from the guests.

The Analytical Case Study: the project follows a logical sequence of steps to fulfill the objectives, in which the structure traces the phases of the DMAIC methodology.

Define Phase: In this initial phase, the objectives of the project are clearly defined. The main target of the define phase is to determine the critical-to-quality (CTQ) into meaningful requirements, it represents the guest's needs, the data were collected by interviewing the hotel guests that establish to conducting well-designed questionnaire to elicit the guest's needs. At the end of this phase, CTQs should have identified and given them the priority based on the importance and satisfaction, through guests' point of view.

Voice of customers (VOC): VOC is a method that captures customers' requirements. It makes a detailed set of customer needs and expectations which are prioritized in terms of relative importance and satisfaction. VOC's was collected by conducting in-depth interviews with the hotel guests and survey of guests. Consequently, long list of VOC's have been extracted, and after undergoing revising, merging and summarizing, refined list of guest's requirements (VOC's) have been reached which identified in the Table-1.

Critical to quality (CTQ): Through collaborating between the project team, an intensifying brainstorming session has conducted to identifying the CTQs that made inference based on the importance and satisfaction for the guests.

The CTQs for the project are quite clearly defined in Table-2. Also, the table shows the results of the survey, which has conducted to provide the guests with an opportunity to rate their overall importance and satisfaction for the CTQs, with a scale of five-points, (5-Excellent, 4-Good, 3-Moderate, 2- Poor, 1-Not care) this scale refers to the importance (I) and satisfaction (S) for the CTQs from the guest's point of view. Subsequently, Table-3 summarizes the average of importance and satisfaction for each CTQ.

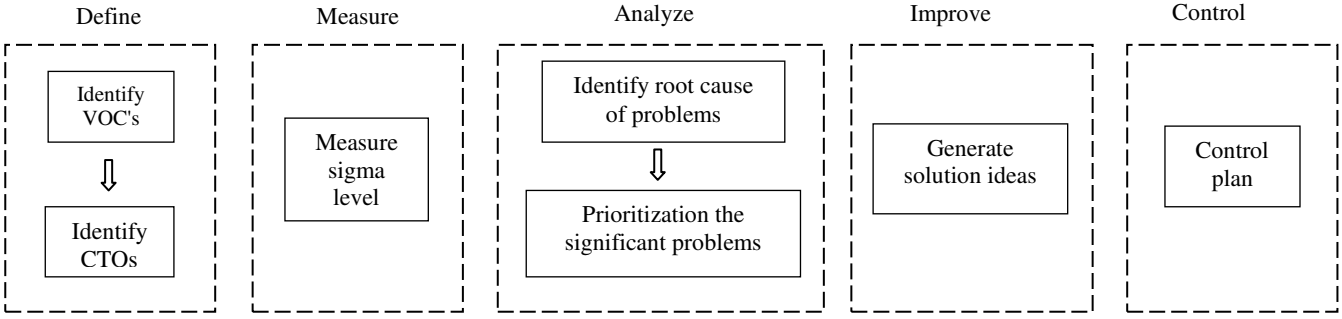

Figure-1: Project methodology.

Table-1: List of VOC's.

Front office VOC's		Housekeeping VOC's	
VOC	Interpretation	VOC	Interpretation
Welcome and care	Courtesy	Coordinated walls color	Room appearance
Quick check-in	Time	Comfortable room lights	Room contents
Quick checkout	Time	Clean room	Room appearance
Trained employees	Employees effectiveness	Provide with some supplies (towels, some rugs, printer etc.)	Room contents
Choices in booking	Variety	New carpets	Room appearance
Get room anytime	Reliability	Prompt service	Quick response
Plurality methods of payment	Variety	Easy access to internet	Internet service
		Signal and speed of internet	Internet service

Table-2: CTQs questionnaire results.

	CTQs	Scale									
		5		4		3		2		1	
		I	S	I	S	I	S	I	S	I	S
Check-in	Simplicity of procedures	123	159	83	40	11	15	0	3	0	0
	Speed of service	152	108	38	67	15	32	12	8	0	2
	Treatment and style staff	93	132	116	56	2	21	5	4	1	4
Checkout	Simplicity of procedures	85	113	89	56	35	36	8	7	0	5
	Speed of service	99	13	76	13	29	65	12	97	1	29
	Treated and style staff	161	135	49	58	3	17	3	4	1	3
Booking	Room availability when booking	13	12	82	85	23	112	98	7	1	1
	Reliability of booking	92	105	112	88	9	10	4	11	0	3
Prices and method of payment	Prices	52	27	60	86	53	70	44	22	8	12
	The availability of payment options	23	81	9	94	65	32	79	7	41	3
Guests room	The consistency of paint colors	109	81	79	78	19	45	5	11	5	2
	Lights of room	45	57	63	66	72	39	24	37	13	18
	Cleanness of room	95	107	87	66	35	37	0	6	0	1
	Provide tools and equipment in the room	102	11	88	13	23	71	4	97	0	25
Room services	The willingness of room services to help you	143	162	71	54	3	1	0	0	0	0
	Room Service staff response to your requests	119	132	81	71	15	12	2	1	0	1
	Efficiency of staff	114	187	101	19	2	10	0	1	0	0
Internet service	Easy access to internet	89	98	95	61	28	47	3	7	2	4
	Speed of internet	121	12	74	19	22	61	0	58	0	67
	Quality of signal	168	5	45	75	3	99	1	16	0	22

In accordance with the literature review, the matrix plot of average of importance and satisfaction were conducted by using Minitab software, where the importance of the X-axis and satisfaction with the Y-axis, both X, Y axis has a scale of 5, the satisfaction horizontal line (with a value of 3.928) and the importance vertical line (with a value of 4.153) divide the region into four parts to assess the CTQs as shown in Figure-2, where noted that points: 5 (checkout process), 14 (room supplies), 19 (speed of Internet) and 20 (Internet signal) are located within the red zone which takes the extreme importance in the development process, because their importance for guests is a very high and the low degree of satisfaction.

The points 1, 2, 3, 6, 8, 11, 13, 15, 16, 17 and 18, they are located in the region that are very high importance, but at the same time, the extent to which high customer satisfaction as well. So, it is not valuable to work on these CTQs, because they have great satisfaction of guests.

Points 4 and 10, they represent a very high satisfaction, although they are not important for guests. Therefore, it is not considered critical points to be taken into account. And the points 7, 9 and 12 occurred in the area that has little importance and little satisfaction, but it is not worthy to focus attention on these points.

Finally, based upon these findings and in agreement with the hotel management, the project team selected the most important CTQs. The CTQs are 5 and 19 (the point 5 represents the speed of checkout, and 19 represent the speed of internet) it has been selected to conduct the appropriate measurements and analysis them, and then apply any possible improvements.

Measure Phase: Measure is the second phase, would help in establishing the capability of the given process and ascertaining current performance levels. In many ways, measurement is at the heart of the excellence project. Measurement is so important, it is certainly at the heart of Six-Sigma. Therefore, it helps to understand the current state and performance of processes. The purpose of this phase is to evaluate what the hotel is currently capable of doing. This evaluation helps identify the hotel's existing process capability with respect to meeting the guest requirements and facilitate the identification of key gaps. It is important to establish the measurement system that enables the monitoring of the process progression under analysis with regard to the objectives set in the previous phase. A well-considered data collection plan is critical because the data must be precise and reliable. Consequently, bad information is driving bad decision making. Finally, this phase was completed by determine the process capability and calculate the level of Sigma.

Measuring the current state for checkout: The current situation has been measured for the checkout process, as the most important CTQ that affecting in customer satisfaction, so we focused our interest on checkout time (The time it takes until the completion of the guest checkout process). Therefore, related data (variable data) to current performance has been gathered, by conducting reliable measurements to find out checkout time.

Table-3: CTQs importance and satisfaction.

CTQs	Importance	Satisfaction	CTQs	Importance	Satisfaction
Check-in			Guests room		
Simplicity of procedures	4.516	4.636	The consistency of paint colors	4.300	4.037
Speed of service	4.521	4.249	Lights of room	3.475	3.493
Treated and style staff	4.359	4.419	Cleanness of room	4.276	4.253
Checkout			Provide the tools and equipment in the room	4.327	2.484
Simplicity of procedures	4.157	4.221	Room services		
Speed of service	4.198	2.465	The willingness of the staff room services in helping you	4.645	4.742
Treated and style staff	4.687	4.465			
Booking			Room Service staff response to your requests	4.461	4.530
Room availability when booking	3.037	3.461	Efficiency of staff	4.516	4.806
Reliability of booking	4.346	4.295	Internet service		
Prices and method of payment			Easy access to internet	4.226	4.115
Prices	3.479	3.433	Speed of internet	4.456	2.313
Availability of payment options	2.512	4.120	Quality of signal	4.751	3.115

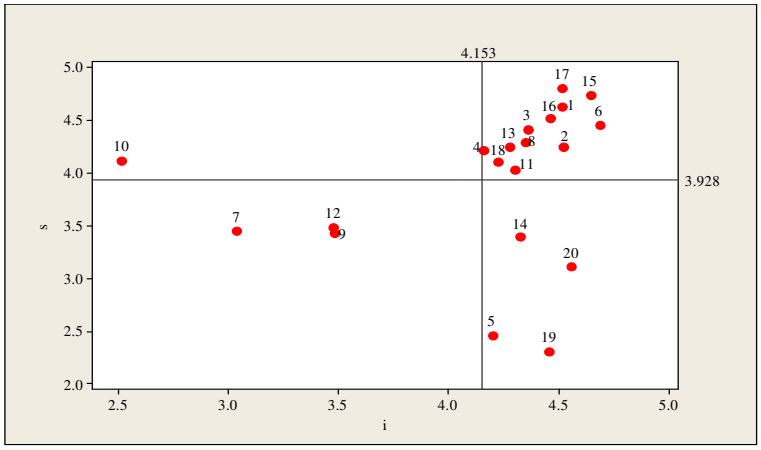

Figure-2: Matrix plot for CTQs.

Table-4: Checkout time.

Guests	Duration	Guests	Duration	Guests	Duration	Guests	Duration	Guests	Duration	Guests	Duration
1	4	17	5.5	33	4.5	49	5.25	65	6.5	81	6.25
2	5.5	18	4.5	34	7	50	4	66	6	82	4.75
3	7	19	6.25	35	7.5	51	6.5	67	8.25	83	3.5
4	6.5	20	4.5	36	5.5	52	3.5	68	10	84	5
5	5.5	21	4	37	6.25	53	6.75	69	6	85	5.25
6	4.5	22	5.5	38	4.75	54	5.5	70	5.5	86	8
7	5	23	4	39	3.5	55	4.5	71	5.5	87	5
8	6.5	24	4.5	40	5	56	4	72	6	88	5
9	4	25	10	41	5.25	57	3.75	73	7.5	89	4.5
10	5.25	26	3.5	42	8	58	6	74	6.25	90	9.25
11	6	27	4.25	43	5	59	6.5	75	4.5	91	10.5
12	3.5	28	4.75	44	5	60	5.25	76	5.75	92	5.5
13	5	29	12	45	4.5	61	3.5	77	6	93	5.75
14	15	30	5	46	9.25	62	7.5	78	22	94	6
15	7.5	31	6	47	7	63	5.75	79	7.5	95	6
16	5.25	32	25	48	4.5	64	8	80	5.5	96	5

Table-4 reveals the durations of the time taken to the checkout process. A random sample just under 100 guests were taken at intervals spaced.

By brainstorming session for the project team, as well as the reference to the needs of the guests have been identified the upper specification limit (USL) and the lower specification limit (LSL) for the time required in checkout process. As identified by (LSL= 4:00 minutes, USL= 6 minutes).

It important to make sure that the gathered data on the current checkout process were normally distributed. So that Minitab program has been used to draw the boxplot of data as in Figure 3 which shows outliers' values which will be deleted from the data obtained that would affect the accuracy of the results. Consequently, Figure-4 confirms the data is normally distributed.

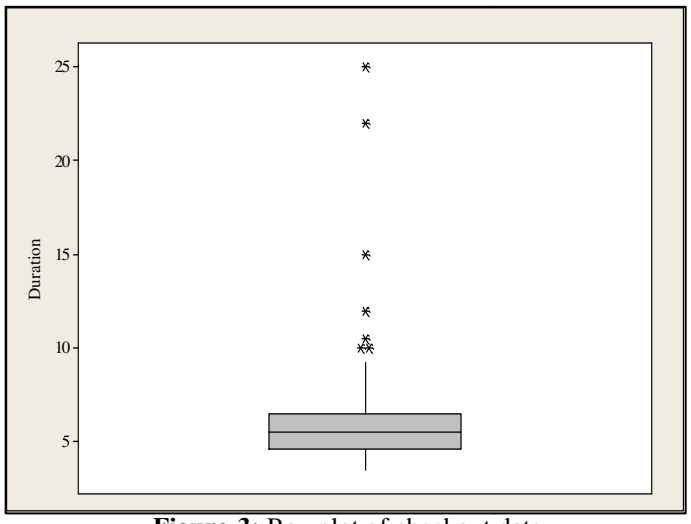

Figure-3: Box plot of checkout data.

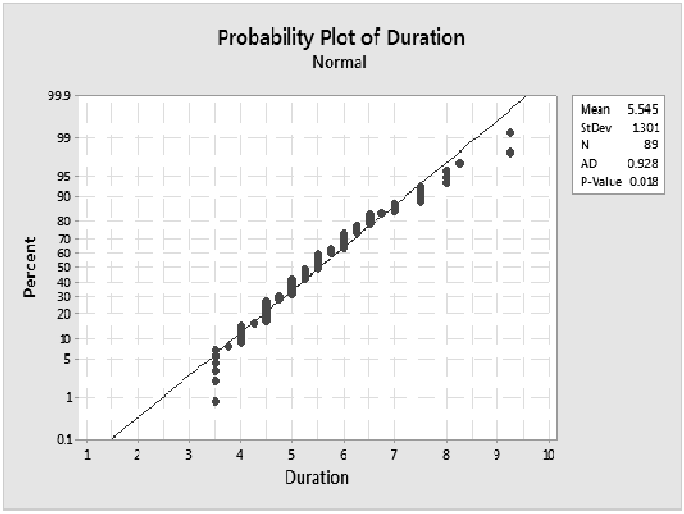

Figure-4: Normality test for checkout data.

After determining that the process is in statistical control, it is important to know whether that process is capable. The capability analysis has been conducted for the data which was collected for checkout time. The small size of the sample reflects the difficulty of measuring the checkout process. The process capability has been performed to determine whether the checkout process is within specification limits and delivers acceptable service level.

Figure-5 visually examines the sample observations in relation to the process requirements. Obviously, the spread of the data is wider than the specification limit, there are checkout durations below the lower specification limit (LSL) and above the upper specification limit (USL). Data that are outside the specification limits represent dissatisfactions which suggest poor capability.

Therefore, the observed performance indicates to the value of Parts Per Million (total PPM=112359.55), that the process is currently working at 2.7 Sigma which is 86% yield. The 78651.69 are less than LSL, and 33707.87 are greater the USL.

Generally, higher process capability index (Cpk) value indicates a more capable process. In this process Cpk has a low value of 0.40 that indicates this process is not capable for the long term. Also, the values of Cp and Cpk differ, then the process is not centered.

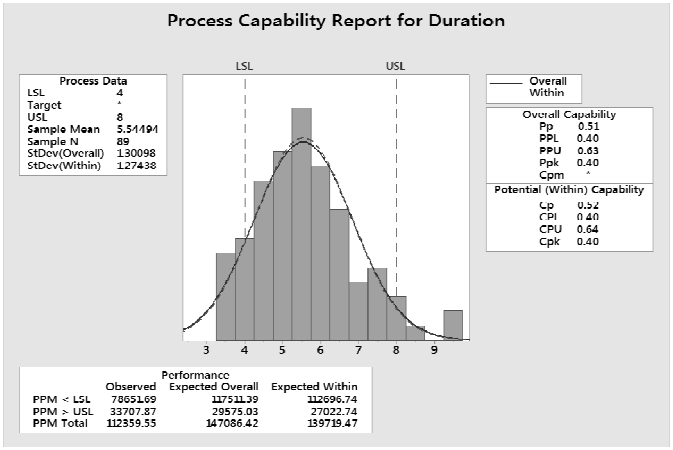

Figure-5: Process capability of checkout process

Analyse Phase: In Six-Sigma methodology the third step is Analyse. During this phase, the data gathered in the previous phases is used to analyse the gap between the existing and the required performance. In addition, a root-cause analysis was conducted to identify the potential reasons for the performance gap and quantify the primary causes of dissatisfaction. The difference between the present and desired state should be eliminated that will lead to higher satisfaction level among the hotel guests and will reduce the guests' complaints. In simple words, the main objective of this phase represented in two tasks. The first: Identifying the root causes of problems. The second: prioritizing the significant problems. The outcome of the Analyse phase should provide the most important factors which must be given focus and in the same time represent opportunities for improvement to work within the Improve Phase.

Identifying the root causes of problems: The analysis is started with Root Cause Analysis; it is a systematic process that aims to identify the factors that had an effect on the nature, extent, place, and timing of a harmful outcome to former events with an objective of identifying the factors that prevent the bad results to recurrence. The main goal of this approach is to identify the 'root-cause' of the problem in order to avoid future occurrence. For this, the team did this mission by conducting the most commonly used tool "cause and effect diagram".

Cause and effect diagram for checkout: Based upon Measure phase, the checkout process was very low level of Six-Sigma. So, should look at the root of the problem and find the causes that have a role in the problem. The team had an inclusive discussion with the process staff to identify the data that can be gathered on the potential causes in the cause and effect diagram. Figure-6 illustrates most of the reasons that led to a lack of customer satisfaction for the checkout process in Alnoran hotel.

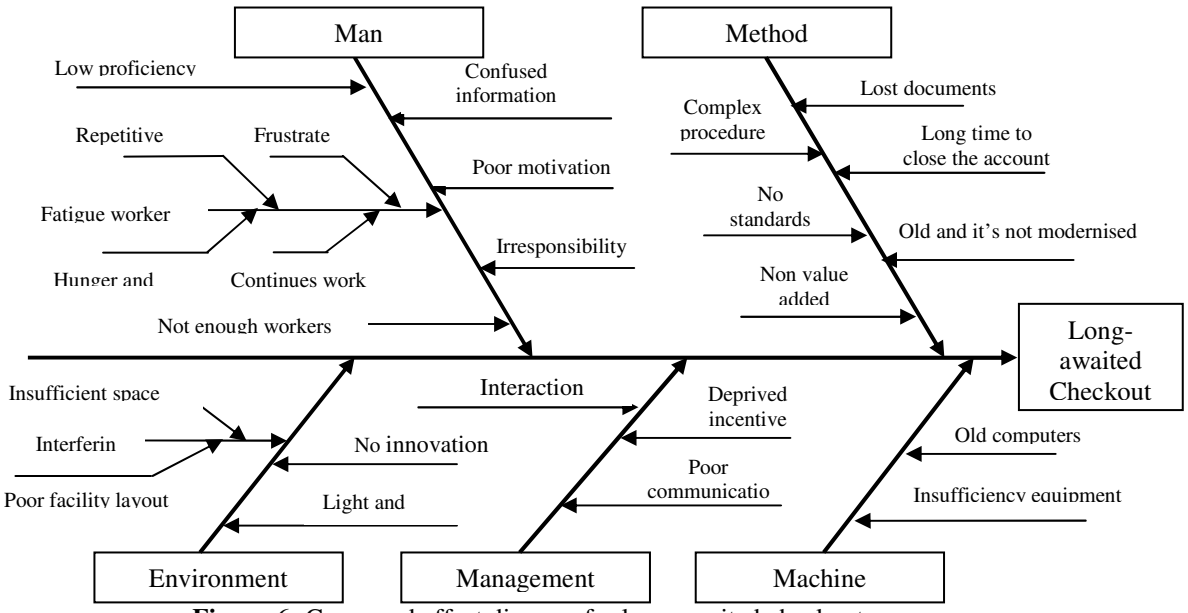

Figure-6**:** Cause and effect diagram for long-awaited checkout.

Prioritizing the significant problems: Despite identifying the greatest causes of the problem, the cause-effect diagram does not obviously indicate each one's contribution to the problem. Prioritization matrix was built to understand this impact, which provides the values for each of the possible reasons which might be causing the problem.

Pareto diagram was built to prioritize the focus of improvement actions based on the importance of the causes affecting in checkout and. Where could use these proven tools for making tough decisions in an objective way to access the actual causes that stand behind these problems, were taken to be addressed in the next phase.

Prioritization matrix for checkout process: Initially, in a Prioritization matrix to be with the possible causes in first column from the left. Then, in the second, third and fourth columns placed a weight of the causes from 10 scales as in Table 5 for each of the (occurrence, severity, and treatment). By the project team in partnership with management and process owners. The total column shows the sum of points which obtained from multiply the weighted values to determine the cause's total score, which indicates the importance of each possible reason. The last column shows the percentage of importance of potential causes. The causes are listed as they are mentioned, not according to priority.

After completing the Prioritization matrix for the checkout process as shown in Table-6 it became clear that the causes that had high score are more possible cause's impact on the process. Quite clearly, lack of standards was ranked first for the potential causes of the problem, which could cause errors in the bills, thus have high impact on guest's satisfaction. As well as the front office clerk takes a long time to contact with all department in the hotel to close the guest account in the hotel, as well as in the preparation of the bill.

Table-5: Rank of (occurrence, severity, treatment).

Rank	Occurrence	Impact	Treatment
10	Maximum occur	Maximum impact	Maximum hard
9	Extreme occur	Extreme impact	Extremely hard
8	Very high occur	Very high impact	Very high hard
7	Moderately high likelihood	High impact	High hard
6	Medium likelihood	Less impact	Hard
5	Moderately low likelihood	Moderate	Moderate
4	Low likelihood	Minor	Easy
3	Very low likelihood	Slight	Very easy
2	Remote likelihood	Very slight	Extremely easy
1	Extremely unlikely	None	Maximum easy

It is also one of the important causes, which is also scored high priority in the Prioritization matrix is the difficulty and length of the procedures followed in the hotel in checkout process and perhaps this action may be unclear in some cases because of interaction in decisions. Last but not least, one of the possible causes that got high score is the "Non-value added" whether the employees or the guests, as make phones or drinking coffee or delve into other topics cause a delay in checkout process.

Pareto Chart: Pareto charts of the effects have been used to determine the magnitude and the importance of causes. The principle is known as (the 80-20 rule, the law of the vital few) states that: for many events, about 80% of the effects come from 20% of the causes.

It is obvious that Pareto chart helped the team to identify the most common categories in the column of score in the Prioritization matrix related to the different causes of problem. Through Figure-7 for Pareto chart which identified quite clearly the most important reasons that influenced in the checkout. In checkout of the hotel "No standards" was the most important reasons for the decline in the level of quality of service with score (900) and percentage (30%). And "closing the guest's account" was the second important reasons with score (800) and percentage up to (26%). Besides, "complex and long procedures" was in third position with score (648) and (21.6%). Together (cumulatively) they represent 78.3% of the problem.

Table-6: Prioritization matrix for checkout process.

Checkout process						
No	Potential causes	Occur	Impact	Treatment	Score	Percent
1	Low budget	2	4	2	8	0.047
2	Insufficient equipment	5	5	5	15	0.088
3	No standards	9	10	10	29	0.171
4	Complex and long procedures	9	9	8	26	0.153
5	Non value added steps	8	8	8	24	0.141
6	Long time to close the guest account	10	10	8	28	0.165
7	Poor facility layout	6	3	3	12	0.071
8	Interaction decisions	3	3	2	8	0.047
9	Irresponsibility from personnel	2	1	1	4	0.024
10	Lack of data	3	6	2	11	0.065
11	Another causes	2	1	2	5	0.029

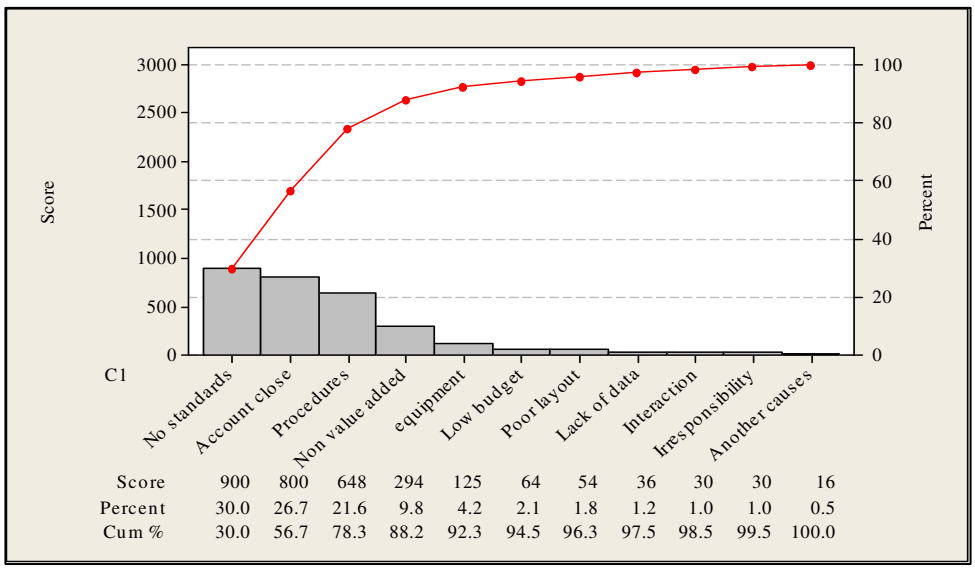

Figure-7: Pareto chart for checkout process.

From the previous could deduce that the most important causes for Checkout process problems, which will be carried over to the Improve phase: (No standards, closing the guest's account, and complex and long procedures).

Improve phase: This phase work to improve the process, fulfill changes to the process to make it more effective and efficient. All this comes from the insight provided by the analysis phase.

The purpose of the improvement phase is to select solutions based on the data that already analysed. The team needs to generate, select, and finally implement a solution to eliminate or reduce the root causes of problems. The process of generating ideas and solutions constructed by brainstorming meetings. Afterward, classify the solutions that have been generated based on difficulty and payoff by using Pick chart.

It is very necessary for this phase to take solutions that suit the hotel culture, which ensure that the solutions will not have a bad impact on the hotel guests. In addition to consider the budget for the process improvement, and goals have set in the project plan. In view of the difficulty of implementation in the hotel, where it needs to budget as well as approval of the management to implement these solutions. Therefore, the study merely just to provide proposed solutions.

Improvement suggestions

Intensified brainstorming has been held among the project team to generate number of solutions which proposed to solve the problem of delay in checkout. These suggestions presented to the hotel management to take the decision in the possibility of their applicability in future.

Checkout problem: Checkout process is the last chance to improve the customer's impression. Therefore, it is very important to improve this process because it can change the impression of the customer every time which spent in the hotel. Through Pareto chart it has been found that the most important causes of delay in the checkout process are: (no standards, long time to close down the guest's account, and complex; long procedures) The team focused its efforts on finding practical solutions to these three causes, that are responsible for 80% of the delay.

Potential solutions: i. Apply standards for checkout process: standards make employee familiar with the activities performed to achieve the goals. Naturally, standards can make the hotel even more successful and make the process easier, clearer, and more precise. ii. Provide staff with training that would have an effective and significant role in the development of front desk staff and work to increase productivity. It gives them information that will help to attain goals and enhance their skills and capability. These skills enable the employee to overcome their problems and find better solutions. iii. Provide an appropriate number of room services which would speed up the process of checking the room when guest plan to leave. iv. Gusts can ask to prepare the bell in advance by making a call before arriving in front office. Therefore, this process may reduce the time required to close all room accounts in the hotel. v. Provide the hotel with good management software which manages all aspects of hotel operations and linking the entire hotel directly in order to avoid wasted time in making connections during the preparation of the bill to the guest upon departure, vi. Various checkout methods: It is possible to provide other ways to checkout that help customers rapidly leave, especially at peak times or for customers they need to leave quickly without having to pass the front office and pay the bill, it is possible to take advantage of technology to provide multiple ways to leave and increase customer satisfaction, among them for example: *Express checkout:* Guests who use a credit card and want to leave the hotel without stopping at the front desk can do so by leaving their keys in their room or putting them in the express box located at the front desk.

Classify solutions: After generating solutions the team used a PICK chart to organize and prioritize their solution ideas by dividing them into four classifications: Possible, Implement, Challenge, or Kill, based on the level of difficulty and payoff for each solution. The team in a formal meeting placed the degree of difficulty and payoff of solutions and give it a value of (1 to 5) as in Table 7. By using Excel sheet have placed these values on a scatter diagram as shown in Figure-8. Values have emerged as follows: i. Implement (easy to implement and a high payoff) (a) Standards for checkout procedures, (b) Speeds up the process of checking room when guest leave.

Ideas that are located in this quadrant are generally the ones that should be acted upon. i. Possible (easy to implement but have a low payoff) (a) Training the front office staff (b) 2- Prepare the bell by making a call before arriving in front office.

Should probably only be done if there is enough time. i. Challenge (hard to implement and difficult to determine payoff) (a) Provide with good management software.

These ideas may still be viable if there is an easier way to do them and take advantage of them. i. Kill (hard to implement and have low payoff) (a) Various checkout methods.

Ideas are normally dismissed outright, but even if "Kill" ideas should be reviewed and revised into something more accomplishable.

Control Phase

The last and finalizing step in DMAIC framework is the Control Phase. The objective in this phase is to control the accepted solution and ensure that the gains derived from the improvement are maintained. However, the main idea to achieve this by a conducting control plan that ensures the guest satisfaction improvements sustained after the decision of top management in

the hotel to keep on with the implementation of solutions. This phase focuses on follow-up the project whether things going properly and taking corrective action when either the project deviates or the environment changes. In other words, ensuring the goals are being met.

Table-7: Rate of (Difficulty, Payoff).

No	Solution Ideas	Difficulty	Payoff
Checkout solutions			
1	Standards for checkout procedures	2.2	3
2	Training the front office staff	2	2
3	Speeds up the process of checking room when guest leave	2	4.2
4	Prepare the bell by making a call before arriving in front office	2.45	0.5
5	Provide with a good management software	3.5	4.9
6	Various checkout methods	4.6	2.25

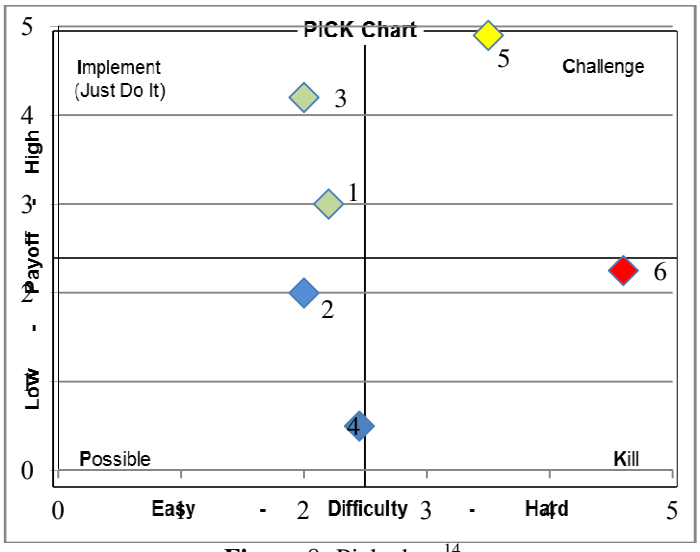

Figure-8: Pick chart[14].

Control plans: A Control Plan as in Table-8 is a document describing what is needed to maintain the processes at its best level after implementing the improvements. The control plan ought to identify how will monitoring the processes (control technique), how will measure the process steps, how critical it is to guarantee that this step is under control, actions to be taken when problems take place, and who is responsible for following-up each process step. Since the suggested solutions have not been applied for this reason was sufficient to provide a model for a control plan that would be distributed to the stakeholders after the implementation of solutions would take place, to follow up any possible deviations that would appear and take the necessary actions to deal with.

Conclusion

Six-Sigma methodology has been accepted worldwide for improving the service industry. Before initiating Six-Sigma project, it is essential to know the distinctive elements of service processes and identify opportunities for improvement and establish effective performance measures.

The management should realize the significance of customer satisfaction and to maintain an acceptable level of service quality provided by the hotel. This would enhance customer satisfaction and loyalty, in addition to get rid of any dissatisfaction that could cause the loss of the customer in favor of competitors.

Process to meet the customer requirements to achieve full satisfaction is very difficult, especially in the services sector, where the customer requirements increased dramatically, and it is difficult to catch up only through continuous improvement. Therefore, it is necessary to create channels of communication with customers to determine and measure their satisfaction with the service offered by the hotel.

The case study presented is an example of how Six-Sigma methodology can measure the process and improve the service quality. However, the project focused on two aspects. First, identify the CTQ's based on customer requirements by conduct interviews and questionnaire with the hotel guests. The second important aspect is to identify the root cause of problems and generate solutions to eliminate them.

The DMAIC cycle been the basis of the proposed methodology, the phases were performed in order to define, measure, analyze, improve and control. Each phase used several tools and various techniques as required. However, it has been clearly shown that there is a need for many studies that would help to understand the significance of Six-Sigma.

Although many limitations are ingrained in the case study, Alnoran hotel was the first organization within the Libyan hospitality sector to apply this problem-solving approach. This study demonstrates insight research into the potential benefits of achieving Six-Sigma practices among hospitality organizations. Also, one of the most important limiting factors in this field is the difficulty in quantifying and gathering data from service processes, because the hotel does not mention to quality data and quality program. Overall, implementation of solutions that could improve the processes need to enough fund and acceptance from hotel management.

Table-8: Proposed template for the control plan[15].

Project Name		Process Owner			Date
Project Manager		Responsible Control Manager			
Process Step	Control technique	Measure / metric	Criticality (High, Medium, Low)	Actions to be taken when problems take place	Responsibility

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