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The Importance of Statistical Applications in Making the Decisions of the Hotel Operations

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Abstract

Today, Statistical Process Control (SPC) has been considered as a new way of thinking for supporting managers' decisions at all levels of a firm to achieve excellence in operations and performance through the effective utilization of statistical tools. An important SPC tool is the control chart, which can be used to detect changes in process with a statistical level of confidence. Service management literature reports relatively few instances of SPC applications in the service sector for monitoring service processes variance (at hotels in particular) assuming that implementing SPC tools or charts outside conventional applications gives rise to many potential complications and poses a number of challenges. Therefore, the main purpose of this study was to explore the usage of SPC tools in Egyptian five-star hotels by means of a semi-structured personal interview based on a closed questionnaire plus a set of open questions which allowed clarifying certain points using the front office (F.O) department as a case study in attempt to enable such methods to be used more effectively and extensively for monitoring service processes at hotels assuming they are considered beneficial. The findings showed that there is a high shortage in application of statistical methods (SMs) and analytical tools in Egyptian hotels which implies that the importance of SPC for variability reduction and quality improvement must be recognized in Egyptian hotels and the potential benefits of SPC should be understood by all decisions-makers at all levels of a hotel.

Keyword: Quality Management, Performance Measurement, Variability, Decisions-Making, Service Quality, , Process Management, Monitoring, Control Charts.

Introduction

Today's increasingly competitive environment leaves no room for error, and consumer market experience an ever-increasing demand for better products and service continuously (Oakland, 2007; Srinivasu et al., 2011; Mariappan et al., 2012; Patyal and Maddulety, 2015). Customers expect continued and consistent high performance even when they pay less for them than the previous purchase prices in order to be satisfied as customers should not be required to make a choice between quality and price (Antony and Taner, 2003; Oakland, 2007). Even for already high-performing organizations, Snee, (1990); Tsikriktisis and Heineke, (2004); and Evans and Lindsay, (2011) referred that past customers experience always produces higher expectations, and customer satisfaction will increase as performance improves.

According to, Xie and Goh, (1999); Besterfield et al., (2004); Oakland, (2007); Evans and Lindsay, (2011); and Mahanti and Evans, (2012), continuing to apply the basic principles of quality management (QM) and performance excellence for reducing variation, defects prevention and doing it right and better the first time and every time for is the most important consideration and the real challenge for managers today. Srinivasu et al., (2011) and Mahanti and Evans, (2012) observed that it is not possible to guarantee that defects will never occur which requires using many quality control (QC) activities for defect identification, prevention and removal.

Consequently, the importance of systematic and objective analysis and thus the need of QM tools have been felt more and a range of new tools has been developed such as Statistical Quality Control (SQC) after a variety of quality strategies such as Total Quality Management (TQM) failed to deliver anticipated business performance improvements in many companies (Zeithaml, 2000; Zhang, 2000; Ahmed and Hassan, 2003; Bisgaard, 2008; Goh, 2014). Due to its efficiency in monitoring processes and achieving high levels of consistent performance in manufacturing industry, Rungtusanatham, (2001); Sulek, (2004); Sulek et al., (2006); Ning et al., (2009); and Goh, (2014) argued that conventional SPC tools could be applied to service processes to achieve the same purposes.

The service management literature reports relatively few instances of statistical operations and a number of researchers ignored or even dismissed the use of SQC methods in service processes assuming that implementing SPC tools or charts outside conventional applications gives rise to many potential complications and poses a number of challenges (Xie and Goh, 1999; MacCarthy and Wasursi, 2002; Sulek, 2004; Goh, 2014). As a result, the full benefits of SPC technique has not been realized in the service sector because of the major differences exist in the quality characteristics of manufacturing and service processes which do not lend themselves to the application of traditional production management techniques such as SPC and have an impact on the approach and substance of quality management (MacCarthy and Wasursi, 2002; Antony, 2004; Sulek, 2004; Evans and Lindsay, 2011; Goh, 2014). Therefore, this study is an attempt to explore the usage of SPC tools in Egyptian five-star hotels and the awareness of the philosophy of process management as a preventive and proactive technique to quality management and a vital requirement for the success of any SPC initiatives instead of the traditional way of function management using F.O department as a case study in attempt to give some advices or recommendations to enable such methods to be used more effectively and extensively for monitoring service processes at hotels, assuming they are considered beneficial with the goal of preventing quality problems rather than detecting them after the fact.

The findings showed that there is a high shortage in the application of statistical methods (SMs) and analytical tools in Egyptian hotels which prevent managers to make effective use of the data which they already routinely collected and hinder to make a good decision and maximize their processes performance effectiveness although there is a full awareness of the philosophy of process and function management among managers. As a result, managers in Egyptian hotels should be recognized the importance of SPC technique for reducing variability and keeping a process operating within a predictable range of variation through preventing any change and removing the causes of abnormalities to ensure conformance to the requirements. Also, both the two philosophies of function and process management are required to adopt in the service

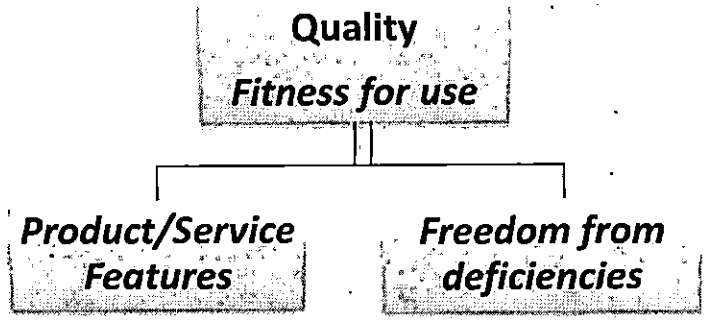
sector to control performance and improve the quality of provided service more effectively.

Literature Review

Reducing Variation for Exceeding Customer Satisfaction

Quality improvement has become related to reduction of variability that unacceptable product or process performance is often the result of variability in quality characteristics (Bjerke, 2002; Callahan and Griffen, 2003; Reis et al., 2006; Evans and Lindsay, 2011). Reneau and Lukas, (2006) stated that variation is the opposite of consistency and considered the enemy of process performance that variability makes performance outcome unpredictable and difficult to interpret. According to Kahn et al., (2002), Mitra, (2003); Oakland, (2007) and Bissgard, (2008), Juran's definition of quality as 'fitness for use' captures the essence of quality and it is widely recognized today as one of the more useful for both manufacturing and service sectors for meeting or exceeding its intended use as required by customers.

Figure 1: Juran`s Quality Definition



Source: Bisgaard, (2008)

According to the previous figure, it is not enough for products and/or services to conform to specifications but also companies have to be able to show a capability of processes to minimize product and/or service variability and remove operational inefficiencies in order to continuously improve product and/or service quality and meet the changing needs of

the customer (Mitra, 2003; Kumar et al., 2006; Bisgaard, 2008; Sharma and Kharub, 2014). Then, management efforts for quality improvement and customer satisfaction should include activities aimed at finding and eliminating root causes of variation and poor quality, not just passive inspection or observation (Antony and Taner, 2003; Bisgaard, 2008; Vassilakis and Besseris, 2010).

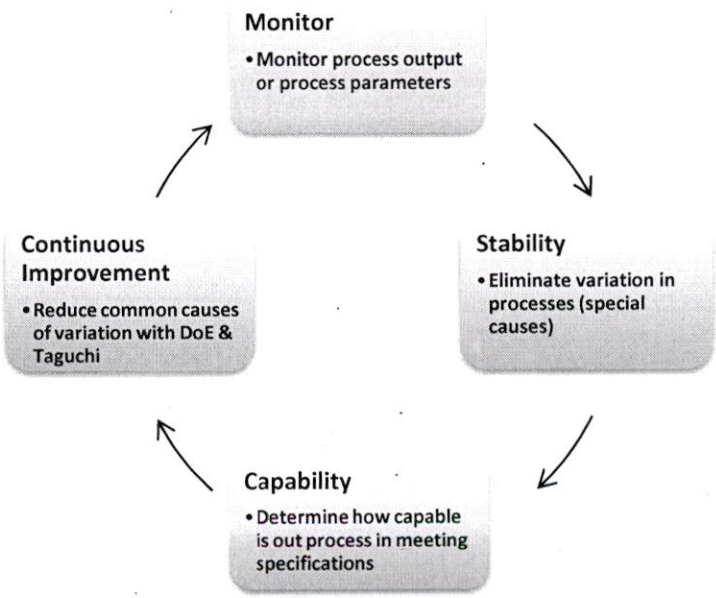
To handle variability effectively, Bisgaard, (2008); Vries and Reneau, (2010); and Sharma and Kharub, (2014) stated that statistical methods (SMs) such as SPC technique must be used to establish not only the estimated level of variation present in a process but also to identify the causes for that variation in order to illustrate commonly occurring obstacles and mistakes in the work environment and take appropriate corrective actions. Also, Mitra, (2003); Goh, (2014); Sharma and Kharub, (2014); and Lim et al., (2015) recommended the use of SPC tools to study the variability of a system, measure process capability and ongoing process control in order to help managers determine how to improve processes and enable a firm to meet customer requirements and enhance its productivity and/or service quality.

Reducing Variability through Statistical Process Control (SPC)

The primary application domain of Statistical Process Control, better known by its abbreviation SPC, has been in manufacturing businesses for monitoring process performance as an important part of quality control and improvement activities (Stoumbos et al., 2000; MacCarthy and Wasursi, 2002; Rai, 2008; Srinivasu et al., 2011; Lim et al., 2015). SPC is statistically and logically built around the phenomenon that variation is always present in any process and no two parts are exactly the same (Lind et al., 2002; Halevi, 2003; Grigg and Walls, 2007; Koutras et al., 2007). SPC described by Callahan and Griffen, (2003); Halevi, (2003); Oakland, (2007); and Thor et al., (2007) as appropriate statistical tools to process for continuous improvement in quality of products and/or services, and a technique for error prevention rather than just merely error detection by providing managers with means to understand work processes and manage by fact through the development of process knowledge.

The application of SPC not only helps to discover and analyze causes of variation to identify and eliminate the root causes of quality problems and minimizes their impact on customers' satisfaction, but also to improve the process to attain a competitive position (Kumar et al., 2006; Oakland, 2007; Sharma and Kharub, 2014). Therefore, effective management must be able to identify and analyze errors using appropriate tools such as SPC in order to take corrective actions and make ongoing enhancements for improved quality and satisfied customers as a part of management strategy for increasing market share and maximizing profit (Harris and Ross, 1991; Mitra, 2003; Caivano, 2005; Vries and Reneau, 2010).

Figure 2: Statistical Process Control Interactivity



Source: (Mason and Antony, 2000)

Harvey, (1998) and Halevi, (2003) argued that SPC is a system for supporting managers` decisions at all levels of a firm because it gives managers feedback on the total performance of the system and on the system-wide impact of their actions. In its most common application, (Kochan, 1990; Pande et al., 2000; Evans and Lindsay, 2011; Sharma and Kharub, 2011), SPC helps an organization or process owner to identify

possible problems or unusual incidents and the operator is then faced with making decisions for corrective actions can be taken promptly to resolve them and control the performance of a process.

SPC Using Control Charts

There are seven basic tools of SPC which are extensively used in problem-solving are: Pareto Analysis, Cause-and-Effect Diagram, Check Sheets, Flow Chart, Histogram, Scatter Diagram, and Control Charts (Ahmad and Hassan, 2003; Besterfield et al., 2004; Oakland, 2007; Srinivasu et al., 2011). Control charts are the most widely used tools in statistics for quality control and improvement by detecting changes in manufacturing processes and service operations with a statistical level of confidence (Stoumbos et al., 2000; Hamza, 2009; Vries and Reneau, 2010). To design or construct control charts for variables, we rely on the sampling theory (Stoumbos et al., 2000; Lind et al., 2002). Usually, about 25 to 30 subgroups and samples between size 3 or 10 are used, with 5 being the most common (Stuart et al., 1996; Berenson and Levine, 1998; Stoumbos et al., 2000; Evans and Lindsay, 2011).

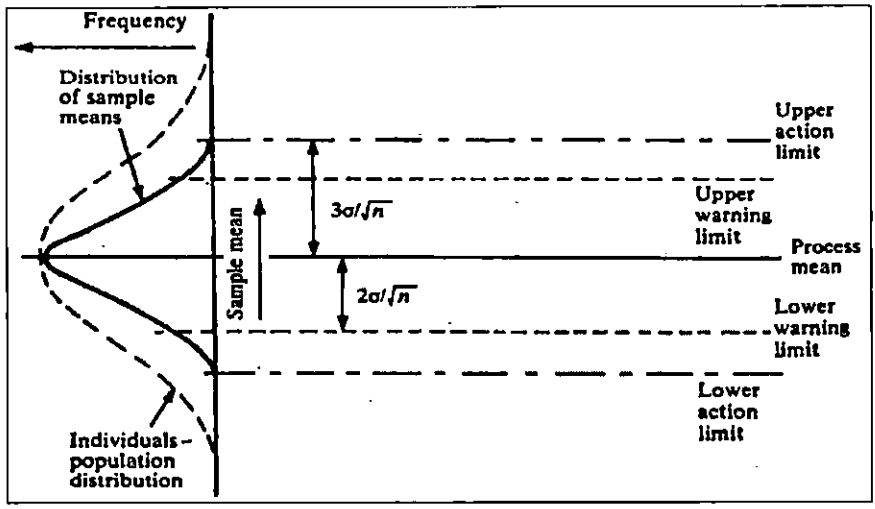


Figure 3: Basic form of a control chart
Source: Oakland, (2007)

Control charts have three lines indicated on a center line and typically upper and lower control limits that are above and below the center line (Lind et al., 2002; Mitra, 2003; Vries and Reneau, 2010). The center line, which typically represents the central tendency of the process characteristics or observations, can also be a desirable target or standard value (Mitra, 2005; Caivano, 2005; Evans and Lindsay, 2011). Two limits, the upper control limit (UCL) and the lower control limit (LCL), are used to discriminate between assignable and common cause variations and make decisions regarding the process (Mitra, 2003; Caivano, 2005).

In the calculation of the upper and lower control limits, the number 3 appears to represent 99.74 per cent confidence limits, and often called the 3-sigma limits (Montgomery, 1992; Aczel, 1995; Lind et al., 2002; Aczel and Sounderpandian, 2005). The control limits are computed to be 3 standard deviations from the overall mean which means that the probability that any sample mean falls outside the control limits is small (Mitra, 2003; Evans and Lindsay, 2011).

MacGregor and Kourti, (1995); Stuart et al., (1996); Vries and Reneau, (2010); and Sharma and Kharub, (2014) observed that control charts can establish operational limits for acceptable process variation and continuously give information on the results from the process to inform the operator when the process is out-of-control and signal the need to take corrective action wherever and whenever appropriate in order to return the process to its normal operating mode. Thus, process improvement can mean shifting the process average performance to a new level or reducing variation around the current average performance (Bisgaard, 2008; Evans and Lindsay, 2011; Sharma and Kharub, 2014).

The Need for SPC in the Service Sector

According to the American Management Association, the average company loses as many as 35 % of its customers each year, and that about two-thirds of these are lost because of poor customer service (Evans and Lindsay, 2011). Mitra, (2003) and Evans and Lindsay, (2011) stated that a manufactured product can be recalled or replaced and the reason for customer dissatisfaction can be readily found and remedial measures

taken when it falls outside certain specifications and not accepted, but rework often cannot be performed in service industries and inefficient processes can only lead to frustrated customers. Variation in service processes makes it impossible to state with certainly how well the process will perform at any point in the future which implies that there is no assurance of achieving desired service standards (Amsden et al., 1991; Sulek, 2004; Sharma and Kharub, 2014).

Hence, service quality is becoming a critical long-term competitive advantage which companies can obtain with logical and systematic use of SPC tools in continuous quality improvement of service processes (Ograjensak, 2003; Antony, 2004). Jones and Dent, (1994); Mason and Antony, (2000); Mitra, (2003); and Hensley and Utley, (2011) suggested that using SPC tools for understanding variability and achieving consistency in service quality characteristics is important to avoid variation which could lead to reliability problems and a lack of service consistency.

Unfortunately, SPC tools has generated far less enthusiasm in the service industry (Harvey, 1998; Mason and Antony, 2000; Antony and Taner, 2003; Herbert et al., 2003), especially not in those instances where the service provided is mainly determined by the direct contact with customers (Roes and Dorr, 1997; Mitra, 2003; Evans and Lindsay, 2011). MacCarthy and Wasursi, (2002) referred that implementing SPC tools or charts outside conventional applications gives rise to many potential complications and poses a number of challenges. The four major problems or difficulties related to using SPC tools for monitoring service processes are illustrated in the following discussion.

Problems of Measurement in the Service Sector

Four major problems or obstacles associated with measurement in the service sector: quality in the service sector defined as the conformance to customer's specifications not company's specifications that customer who defines quality according to his needs and expectations and customer satisfaction may be different for each one (Herbert et al., 2003; Bisgaard, 2008). Mitra, (2003); Besterfield et al., (2004); Evans and Lindsay,

(2011); and Goh, (2014) referred that there is variability among people and often within the same person at different times which makes customer needs and performance standards are often difficult to identify and measure because there is a general absence of common description of what constitutes quality.

Also, objective measurements of a service's quality characteristics is practically impossible because so many of these characteristics are intangible in nature and most service cannot be counted, measured, tested, and verified in advance of sale to ensure quality delivery (Zeithaml et al., 1988; Hays and Hills, 2001; Antony, 2004). Another problem associated with intangibility according to Haywood-Farmer, (1988) and Evans and Lindsay, (2011) is that intangibility may make it very difficult to turn around a poor service because it may be hard to convince dissatisfied customers that the service has really changed for the better. Control of service delivery and quality is complicated by the individual and unpredictable nature of people and customer satisfaction or dissatisfaction takes place during moments of truth (Ghobadian, 1994; Evans and Lindsay, 2011). Mitra, (2003) stated that many factors influence employee behavior such as family life, unforeseen, personal events, mental outlook and all these factors not only can cause large performance variation, but also they are largely outside the influence of the company and cannot be predicted. For most services, service firms' executives may be always unfamiliar with processes and not understand what features connote high quality to customers and what attributes of service must have in order to meet consumer needs and what levels of performance on those features are necessary to deliver high quality service (Dransfield et al., 1999; Antony, 2004; Tsikriktsis and Heineke, 2004; Srinivasu et al., 2011).

The Relevance of SPC to Service Quality

Deming maintained that all work can be considered a process and there are many opportunities for things to go wrong in any type of process that variation is a part of everything — machines, people, raw materials, attitude, deliveries and methods used in the production of products and/or services (Herbert et al., 2003; Mitra, 2003; Oakland, 2007; Ning et al.,

2009; Goh, 2014). Sulek, (2004) and Oakland, (2007) also referred that a process may consist of a combination of human beings, machines, methods, pieces of equipment, or 'intangible human elements such as attitudes, motives, knowledge and skills'. There are usually certain technical aspects of a specific service which are closely linked to customer satisfaction and which can be measured objectively (Wood, 1994; Burney and Al-Darrab, 1998; Mitra, 2003).

According to human behavior measurement in the service sector, Wood, (1994) and Mitra, (2003) also referred that the concentration should be on the procedures that generate representative statistics of performance to be able to counteract the performance variation in human behavior. For example, Apte and Reynolds, (1995) mentioned that KFC (Kentucky Fried Chicken) radically reduced the standard for waiting time at drive-through windows to 60 seconds to remain competitive with other quick service restaurants.

Therefore, the application of SPC in the service sector can be just as valid and beneficial as it is to the manufacturing industry. On the other hand, most of researchers focused on processes performed a way from customers and recommended that identifying the most appropriate area for the implementation of SPC tools and choosing processes which are not include direct interaction with customers. This means that there is still a problem for applying SPC for monitoring all processes in the service sector because there is not a method facilitate implementing SPC tools to those processes which include direct interaction with customers without problems.

Research Methodology and Data Collection

The purpose of the research was to explore the usage of SPC tools in Egyptian hotels for monitoring service processes and investigate to what extent the managers are aware of the philosophy of process management as a vital for the success of any SPC initiatives. In order to meet the research objectives, questionnaire in the form of a semi-structured interview were conducted on 25 five-star hotels were all located within the area of Cairo. A total of 27 hotels were invited for the data collection process in the study; 25 hotels agreed to participate and only 2 hotels

rejected the invitation. Selection of research participants was not a random process as this would not have served the research purpose. The rationale was to approach hotels with the amount of resources in terms of finance, people, facilities, technology and time for the efficient and effective use of such tools.

As the research focused on investigating the possibility of applying SPC tools for monitoring service processes, especially which include direct interaction with customers, F.O department was the most appropriate department to be used as a case study to investigate to what extent SPC tools can be used for monitoring service processes and the related problems or difficulties. The interviewees were front office managers, front office assistant managers, human resource managers, front office supervisors, quality manager and the director of training. The difference or diversity of respondents' position was unwilling or accidental because the interview was mainly targeting F.O managers only as mentioned previously. The diversity of positions was a result to that some of the F.O managers were unconvinced that the response to such questions is related to their tasks, and it is not their responsibility to know or use such statistical tools for employees' performance evaluation and service quality measurement.

The data collected by means of a semi-structured personal interview based on a closed questionnaire plus a set of open questions which allowed clarifying certain points. After the interviews started, a closed questionnaire was presented to interviewees, which is and effective and efficient way for obtaining sufficient information within a short period time. The suitability and validity of questions was tested on a sample of manufacturing firms and service organizations (MaQuater et al., 1996; Herbert et al., 2003; Grigg and Walls, 2007). The questionnaire was designed to meet the objectives that had been set. The process of developing the questionnaire finished with a pilot survey (36 per cent or five hotels), which was used to modify and eliminate a number of variables and keep the questionnaire as short and simple as possible, and after refinement the final questionnaire was designed. Two categories of questions were asked during the interview:

Group 1: The first group of questions investigate the philosophy of management adopted in Egyptian hotels, the methods and indicators are normally used to evaluate performance and quality of service, and the statue of SPC in Egyptian hotels (application – the common statistical tools are normally used – benefits – obstacles – motivations). **Group 2:** The second group of questions investigates the use of Control Charts in particular in Egyptian hotels, as the most statistical tools widely used in manufacturing and service operations around the world, especially in Sweden, Hong Kong and U.S.A, and the related problems of using. Because the study focuses on describing a particular reality or phenomenon, which is the description of the use of SPC technique in Egyptian hotels for making the managerial and operational decisions related to performance control and quality improvement and the awareness of the philosophy of process management and described it accurately, the researcher adopted the descriptive statistical method which focuses on describing and summarizing the collected numbers on the subject and interpreting them in the form of results.

Research Results and Discussion

The study showed that there is a full awareness of the concept of process management in Egyptian hotels as an alternative of function management for performance enhancement and improving organizational business processes, 100% of cases (or all 25 respondents) observed that all work or tasks are considered as a process and include a set of limited standards or procedures, and they actually manage these processes not functions. All respondents or managers in Egyptian hotels are aware of the philosophy of process management regardless their position, qualification or experience which implies that the method or principles of management in Egyptian hotels not depend on managers` skills, knowledge, qualification or experience but it is the operational and managerial policy of a hotel as defined or determined by the parent company in chain hotels, and the management company or a third-party company in independent hotels.

To manager a process properly and effectively, Mitra, (2003); Šulek, (2004); DeVor et al., (2007); and Vries and Reneau, (2010) confirmed that the only way to manage processes easily and arrest the natural

deterioration in process performance is to constantly monitor the process for the special causes of variation and eliminate them. In Egyptian hotels, all respondents approximately (96% of cases or 24 respondents) referred that they manage processes by ensuring that all proper procedures of a process are applied properly as specified standards without any missing points in order to evaluate the actual outcomes and correct any unusual mistakes. All respondents approx. have no idea about the concept of process variation and dispersion which implies that there is concentration on the philosophy of process management in Egyptian hotels at the expense of the behavioral, managerial and cultural aspects of this philosophy of management which result in failure to measure and evaluate processes properly and managers being forced to manage badly.

The method used by managers in Egyptian hotels for managing and monitoring processes is an ineffective and improper method and it is similar to (Inspection-based quality control) approach which has many disadvantages such as non-motivating activity, unreliable, inefficient, time-consuming and provides very little information as to why defects or errors occurred and how they can be corrected (Mason and Antony, 2000; Xie et al., 2001; Antony and Taner, 2003; Mitra, 2003; Chakrabarty and Tan, 2007; Elg et al., 2008; Rai, 2008), and hence the root causes of the defective material remain active in the system (Besterfield et al., 2004; DeVor et al., 2007).

On the other hand, 36% of cases (or 9 respondents) referred that they adopt the philosophy of process and function management together because there are some functional or personal characteristics which cannot be measured or evaluated as a process such courtesy, dependability, work habits, dealing with emergency and sudden situations, etc. All researchers neglected the nature of service as a combination of technical and behavioral aspects and there are some functional or personal characteristics which not subject to the concept of process management which means that both the two philosophies of function and process management are required to adopt in the service sector to control performance and improve quality of service more effectively unlike manufacturing sector.

The answers were collected show that all of respondents without exception (100% of cases or 25 respondents) depend mainly on some non-statistical methods and indicators to detect errors, identify and prioritize problems and determine the weak points in the work environment which enable them to evaluate employees' performance and the quality of the provided service to make their important managerial decisions for the appropriate corrective actions. The most popular and widely used tools or methods and indicators are, mainly, customer survey, customer complaints, customer reviews, and direct observation. Courtesy calls and mystery shoppers rank fifth and sixth, but with an obvious difference compared to the first four methods. The least used ones are Guest Comment Card (G.C.C), monthly evaluation, and informal discussion by personal interaction with guests.

Table 1

Commonly used non-statistical methods and indicators

Tools	Adaption Rate	
	Number	Percentage
Customer complaints	25	100%
Customer reviews	25	100%
Customer survey	25	100%
Direct observation	25	100%
Mystery shoppers	15	60%
Monthly evaluation	9	36%
Courtesy calls	18	72%
Guest comment card	14	56%
Informal discussion	9	36%

Management by fact cannot exist without sound data which can be structured into information support sound decisions and an appropriate method to gather information and analyze it before making decisions on any action to be taken (Steven and Unal, 1992; Stickley and Winterbottom, 1994; McQuater et al., 1995; Halevi, 2003; Oakland, 2007; Rai, 2008; Evans and Lindsay, 2011). Surely, all the non-statistical methods and indicators used by respondents are considered important methods and indicators to detect errors and problems and investigate the

weak points in the work environment from customers' point of view, but using these methods and indicators only are not enough for monitoring service processes and it cannot detect all errors in order to make a good decision. The usage of non-statistical methods and indicators alone is not enough and not effective to make a good decision because these tools or indicators can help us to investigate problems or determine the weak points in the organization in general, but it is not useful for applying the concept of process management and monitoring process variation.

On the other hand, Vries and Berneau, (2010) referred that operators often fail to interpret variation in observations correctly without the help of proper aids which is considered the central problem in management and leadership. The problem is that managers in Egyptian hotels manage processes haphazardly and do not have the appropriate methods or tools which help them to manage or do this properly and more effectively. This is may be a result to that managers in Egyptian hotels (whether chain and independent hotels) are not aware of the different quality management tools and methods (QMMs) (SPC in particular) and they are not ready to know about it or use these tools as long as there is not pressure from parent company or hotel's management to use it or it is not required.

The results revealed that the full awareness of SPC tools has not been realized in Egyptian hotels that all respondents approximately (96% of cases or 24 respondents) involved were not using the tools to maximize their processes performance effectiveness, interviews showed the root cause could be a lack of encouragement to use statistical process control methods and tools that most of the managers do not see the need to introduce SPC tools as long as there is not a pressure from the parent company or the management to use it. The responses showed that all 25 respondents (or 100% of cases) are aware of check list as a basic quality control (QC) tool and use it for more than one purpose, and 16% of cases (or 4 respondents) know and use histogram, whilst control charts are used by only 4% of cases (or one respondent only). Pareto diagram, scatter diagram, flow chart, and cause and effect analysis are not common tools in Egyptian hotels or at least in F.O department as a case study.

Table 2
The adoption rate of the seven basic SPC tools

The seven basic SPC tools	Number	Percentage
Cause and effect diagram	0	0%
Check list	25	100%
Control charts	1	4%
Flow chart	0	0%
Histogram	4	16%
Pareto analysis	0	0%
Scatter diagram	0	0%

It was expected that all managers in Egyptian hotels are aware of check list as a basic tool for quality control because the concept of process control from respondents' view point means that inspection of applying all process procedures or steps as specified standards and exploring for missing points and mistakes. With implementing process management and SPC technique in its proper sense, check list will be considered as a first step to control performance and apply control charts for monitoring process variation. In this case, check list will be used as a tool for data collection only not as a basic quality control tool.

The study revealed that Egyptian hotels depend completely on external companies to design their processes and determine its quality characteristics which affects negatively on using a tool such as a flow chart (or process flow diagram) because all respondents confirmed that they commit to the specified standards and the managerial or operational instruction defined without modification or change. Then, there is no need for managers in Egyptian hotels to know a tool such as flow chart because there is not possibility for using it to change a process in order to control or improve it.

Some respondents referred that they held a meeting weekly and others observed that they held this meeting monthly to discuss customer complaints and the problems in the work environment to identify the most likely causes of these problem considering the different factors or causes of these problems such as materials, employees, equipment, ...etc. to not

discuss problems and its potential causes haphazardly and organize the ideas of brainstorming session but the way of discussion or presenting the results is left to the managers. Although all researchers referred to cause and effect diagram as an important tool for problem-solving by identifying the potential causes of problems and taking remedial actions for correcting them (Mitra, 2003; Besterfield et al., 2004; Evans and Lindsay, 2011), it is not necessary for managers in Egyptian hotels to use cause and affect analysis in its current form as they have or do what achieve the same purpose or goal and there is not a genuine need to use this tool in particular as long as it won't add new.

According to the response or data collected from only one respondent (or 4% of cases) used and applied control charts, the most types of control charts used for monitoring services processes are *X*-chart, *R*-chart, and *P*-chart and each chart used for monitoring specific or limited type of process. The respondent added that control charts used only with certain processes, especially these processes which not include direct interaction with guests or performed a way from customers and which subject to the basic principles of control charts. The implementation of control charts for only those processes performed a way from the guest means that there is still a problem related to the applying control charts in the service sector (at hotels in particular) for all processes. This problem related mainly to the heterogeneity of customers and variability among people which hinder to measure and evaluate employees' performance and quality of service according to specified standards which requires a method to facilitate the using of this tool for monitoring all processes in hotels and compatible with the heterogeneity of customers and intangibility of service.

Wood, (1994); Berenson and Levine, (1998); Burney and Al-Darrab, (1998); Mitra, (2003); and Evans and Lindsay, (2011) listed just a few of the many potential applications of control charts for service processes such as (proportion of rooms satisfactorily cleaned, number of complaints received, average service time, appearance of employees, transaction skills) as an example for the potential applications in the service sector and hotels. The study showed that *X*-and *R*-charts are used together to measure and evaluate sanitation and personal hygiene, appearance of

employees and average service time, whilst *P*-chart applied to monitor invoicing reports errors, customer feedback, and customer complaints. Implementing *X*-chart, *R*-chart and *P*-chart for monitoring such processes has no problems that all these processes not include direct interaction with customers and can be measured and evaluated by the suggested methods mentioned by Berenson and Levine, (1988); Wood, (1994); and Burney and Al-Darrab, (1998).

According to the use of *S*-chart, it is not used as an alternative for *R*-chart in monitoring process variability or dispersion and *R*-chart is currently used more often, although it is more sensitive and better indicator of process variability than the range (Aczel, 1995; Aczel and Sounderpandian, 2005; Evans and Lindsay, 2011). It may be because *R*-chart is easier for managers and employees to understand at least during training programs or sessions.

As mentioned previously that there are some problems related to customers` complaint and reviews or feedback which make it are not always a reliable or a real method or indicator reflects the quality of service or used to evaluate employees` performance, and not useful or helpful to make a good decision. Then, the use of *P*-chart for monitoring customers' feedback and complaints may be ineffective and misleading in some cases because any variation or undesirable changes will appear in process performance may be unreal which leads to making ineffective decisions.

The majority of managers in Egyptian hotels appeared unmotivated to use SPC tools (control charts in particular) for monitoring processes even though its efficiency in monitoring any type of processes and achieving high level of consistent performance both in manufacturing industry and some service processes as demonstrated by many researchers and practitioners (Rungtusanatham, 2001; Ahmad and Hassan, 2003; Antony and Taner, 2003; Reis et al., 2006; Sulek, 2004; Sulek et al., 2006; Oakland, 2007; Reis et al., 2006; Ning et al., 2009). Majority of respondents are not convinced that SPC tools can be considered an essential mechanism for controlling and improving organizational performance in the service sector and in hotels in particular. The

responses of respondents showed the essential problem related to applying technique is the heterogeneity of customers' perceptions and preferences which makes the measurement is too difficult, especially these processes including direct interaction with guests.

Table 3

Reasons for not applying SPC tools

Reasons	Number	Percentage
Not-suitable for service	15	60%
Time-consuming	13	52%
Facilitators shortage	4	16%
Resistance to change	2	8%
Difficult to use	4	16%
Costly	8	32%
Other reasons	0	0%

As mentioned before that managers usually follow-up employees' performance and quality of provided service by regular direct observation and taking a sample during operation using the method of (Role Play) which is considered the same idea of sampling, and then it is not a time-consuming to take sample in different times regularly to construct control chart and monitor process variation and change during operation. Therefore, time-consuming is not a real problem to apply control charts for monitoring processes and control performance.

Other critical problems related to applying SPC tools in hotels from respondents' viewpoint such as shortage of facilitators and difficulty of using can be solved by the parent company or the hotel's management by providing hotels with a team of facilitators to provide training courses in SPC tools and how to applied to monitor service processes. The major sources of costs in implementing SPC are those associated with training, staff time, and any consultancy costs (Grigg and Wall, 2007), but these costs will be temporary and timely which make it very small compared with the benefits hotels can achieve such as reducing variability, reducing service defects which affects negatively process consistency, and then reducing customers' complaints.

Process Variance in the Service Sector

In the service sector, (Rust and Metters, 1996) stated that consistency may be more important than the absolute value of a service offered to consumers. Customers may tolerate delays but they may be very dissatisfied if processes are inconsistent or haphazard as a result of poor control of variation which will generally lead to poor results (Bjerke, 2002; Tsikriktsis and Heineke, 2004). So, if variation is inevitable in the service sector to satisfy different customers with different preferences and requirements (Tsikriktsis and Heineke, 2004; Evans and Lindsay, 2011), how to achieve process consistency according to different customers?

As a solution for the problem related to measurement, especially those processes include direct interaction with guests, process variation in the service sector (at hotels or front office department in particular) should not be seen only as a deviation or the difference between the process` outputs and specified standards such as manufacturing sector but it should be seen or definite also as the deviation or the difference between process` outputs and customer` preferences and expectations even if it is not compatible with the specified standards. Then, service processes variation could be divided into types: the first type related to specified standards and the second type related to customer expectations and preferences).

Table 4: Process Variance in the Service Sector

Definition	
Acceptable Variation	**Unacceptable Variation**
Acceptable variation can be defined as the difference or the deviation between process outputs and customers` requirements and preferences. **For example,** check-in as a process has specified standards or limited procedures must be applied properly, and employees required applying these standards and procedures as	Unacceptable variation can be defined as the difference or the deviation between process outputs and specified standards. **For example,** check-in as a process has specified standards or limited procedures which must be applied properly as defined by employees, any missing point or procedure will be considered as a

customers want and prefer. Then, any unacceptable behavior from customer view-point will be considered as a variation and leads to customer dissatisfaction because of process inconsistency.	variation and leads to customer dissatisfaction because of process inconsistency.
Division of variation	
Acceptable Variation	**Unacceptable Variation**
This type of variation can be divided to desirable and undesirable variation depending different customers' expectations and preferences	This type of variation is always unacceptable or undesirable
How to Avoid	
Acceptable Variation	**Unacceptable Variation**
To avoid this type of variation or make it be desirable, all procedures or specified standards of each process must be applied as customers want and prefer.	To avoid this type of variation, all procedures of each process must be applied as specified standards without any missing points first time and every time
Results of each variation	
Acceptable Variation	**Unacceptable Variation**
This type of variation is a must to satisfy different customers with different expectations and preferences.	This type of variation leads inevitably to customer dissatisfaction because of process inconsistency and it is a must for hotels to avoid and eliminate it to make customers happy with stability and capability of processes.
How to measure	
Acceptable Variation	**Unacceptable Variation**
Acceptable variation can be measured only by customers using guest evaluation card (G.E.C) to collect required data to construct control charts.	Unacceptable variation can be measured by managers using check list to collect data required to construct control charts.
Corrective actions	
Acceptable Variation	**Unacceptable Variation**

Corrective actions related to this type of variation will include employees only.	Corrective actions related to this type of variation will include methods, equipment, employees and environmental conditions.
Causes of variation	
Acceptable Variation	**Unacceptable Variation**
There is one cause of that variation (assignable causes) that all variation results in human behavior.	There are two causes of that variation (common and assignable causes).

Managers will prepare a guest evaluation card (G.E.C) which will be similar to guest comment card (G.C.C) in its form for each process in the department (such as check-in, check-out, complain handling, reservation, call response,...etc.). G.E.C will include all procedures of each process separately, and after providing the service to guest, the G.E.C will be given to the guest by a way or another in order to evaluate the service or a process. For example, G.E.C for check-in process can be put in guest room. By using G.E.C, guest will evaluate a process himself by giving limited marks will be used to evaluate process performance and quality of provided service from the customer' viewpoint (for example, we can use 1 and 0, 1 means appreciated or satisfied whilst 0 means non-appreciated or dissatisfied).

Guest Evaluation Cards (G.E.Cs) will be collected at the end of each shift, and managers take a sample (3 – 5 only) for each shift daily at different times (the beginning, the middle and at the end of a shift) for 14 two weeks to construct the control charts (X-and R-charts). Any deviation or variation will appear in the control chart will be a deviation or variation in customer satisfaction not a variation in process' outputs because a variation in the service sector is inevitable, and in all cases it must be an acceptable variation for customers. This may be an effective way for using control charts for monitoring service processes, especially those processes which include direct interaction with guests.

Conclusion and recommendations

Statistical Process Control (SPC) refers to some statistical methods used extensively to monitor and improve the quality and productivity of

manufacturing processes and service operations. Today, SPC has been considered as a new way of thinking and strategic approach to achieve excellence in operations and performance through the effective utilization of statistical tools. The full benefits of SPC tools may be still unrealized in the service sector (at hotels in particular) which means that there is still a problem of using such methods for monitoring service processes, especially these processes which customers are involved to a degree to be a part of a process.

The results of study reflected a number of recommendations that can be suggested for helping to implement the philosophy of process management properly and facilitate the use of SPC tools for monitoring service processes; especially those processes include direct interaction with guests. The suggested recommendations include the following points:

The importance of the process management philosophy for performance enhancement and organizational business success should be recognized by managers at all levels in Egyptian hotels to increase the awareness of the need to implement this philosophy in the service sector to achieve the related benefits. This can be achieved by preparing awareness session or meeting for one day.

To assist with the effective implementation of process management philosophy in Egyptian hotels, the study recommends that the parent and management companies should provide hotels with effective and advanced educational materials such as (educational clarification videos supported by on-line training) or assign a team of facilitators to provide department managers, assistants and supervisors with training sessions including the following topics:

A full clarification and examination for both two philosophies of process and function management, and prepare a comparison between the two philosophies including (concepts, the proper method of implementation, and the appropriate methods of measurement).

A full examination for the concept of a process and how to identify or design a process and its quality characteristics or parameters to be measured from customers' point of view depending on employees' questionnaire and customer complaints, survey, observations, and informal comments obtained during direct interaction with the customer to evaluate and improve all critical delivery processes and prioritize opportunities for process improvement.

A full examination for the concept of a process variation includes (average process performance and process dispersion) and how it affects negatively on process consistency and leads to reliability problems.

Identifying the different sources of variation (common and assignable causes) and their potential causes according to each process conditions and factors affecting it, and how to determine the type of variation are present in a process in order to take the appropriate corrective actions.

The study recommends that independents Egyptian hotels should seek to contract with third-party companies to provide these hotels with a team of facilitators or effective and advanced educational materials (educational clarification videos supported by on-line training) in order to enable managers to full understand the methods of management and the specified standards the company set.

Identifying processes and its critical characteristics must be the responsibility of department managers, assistants and supervisors instead of parent, management and third-party companies to enable managers change or modify any process according to work conditions and the requirements of control and improvement, and then hotels can achieve the expected benefits of process management and SPC technique implementation.

The study recommends that both two philosophies of process and function management are necessary and required to be equally applied and implemented in the service sector (at hotels in particular) in order to

provide a near perfect service and evaluate employees` performance more effectively.

Non-statistical methods and indicators should be used as an essential component of a detecting-problem approach and investigate the weak points in the work environment and it can do without it. These methods can be used together with statistical methods for two basic purposes: (a) it can be used as data collection methods as a preliminary step to implement statistical methods for prioritizes problems for corrective actions; (b) to provide managers with requisite information helping to evaluate those functional or personal characteristics which not subject to the concept of process management and hotels` facilities standards.

From the organizational experiences revealed in this research, Egyptian hotels should look at the following issues if they want to improve performance and implement SPC technique successfully:

The philosophy of process management must be full understood before applying SPC technique for monitoring processes as an essential prerequisite for the success of any SPC initiatives.

The importance of SPC for variability reduction and quality improvement must be recognized in Egyptian hotels, and potential benefits of SPC should be understood by all decisions-makers which encourages and urge hotels to implement SPC technique to achieve the related benefits and increase customer satisfaction not just to satisfy the demands and contractual requirements or to abide law.

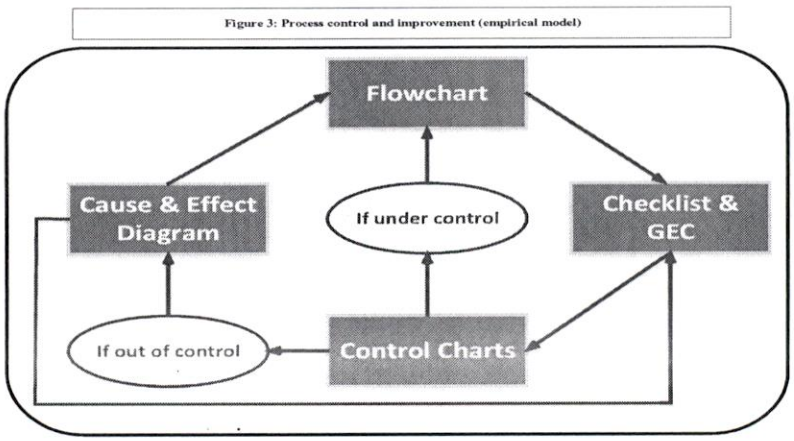
The parent, management and third-parties companies should provide hotels with a team of facilitators train and encourage managers in Egyptian hotels using SPC technique to reduce variability and achieve process consistency.

There should be a full commitment and support from top Egyptian hotels` management to use such statistical methods for reducing variability and improve service processes in order to establish a responsive environment.

There should be a specialist team follow up the effective implementation of SPC technique and evaluate the achieved results in order to guarantee the good practice and due diligence.

To manage a process effectively in the service sector (at hotels in particular), the researcher suggest an empirical framework for the four basic SPC tools are necessary to monitor process performance for a purpose of control and improvement:

Figure 4: Process control and improvement (empirical model)



According to the previous figure, process control and improvement tools not include Pareto analysis, histogram and scatter diagram assuming that management will deal with all potential causes of a problem or process variation.

Managers will use check list to measure process variation according to specified standards and guest evaluation card (GEC) to measure process variation according to customer preferences and expectations.

It is not necessary for managers in Egyptian hotels to use cause and effect diagram in it's a known and current form if they have the appropriate alternative which can achieve the same purpose.

Managers should take temporary corrective actions for detected mistakes or errors during using check list or G.E.C to collect the required data to not allow variation exceed or recur again. Corrective actions not delayed until construct control charts and explore process variability. Then, managers can construct control charts and investigate process consistency to determine the real problem and its potential causes in order to take the appropriate corrective actions.

A set of generic guidelines can assist with facilitating the use of control charts for monitoring service processes using the previous model, which those processes include direct interaction with guests:

Variation in the service sector must be divided into two types (acceptable and unacceptable variation) to discriminate between variation in process outputs according to specified standards and variation in the method of applying these standards according to customers' requirements and preferences in order to ensure that the details of all aspects of everyday process problems (personal and operational problems) are taken into account. Customers should be seen as an essential participating part of process performance evaluation in order to monitor the second type of process variation related to customer satisfaction not specified standards. To monitor two types of variation, managers must use the check list to collect data related to monitoring variation in specified standards, and use G.E.C to collect data required to monitor variation in the method of applying these standards which affect customer satisfaction. Managers can use an electronic G.E.C sent to the guest on phone number or e-mail instead of the manual one to avoid the disadvantages or problems related the possibility to modify it by employees.

Managers in Egyptian hotels required to be aware of valid and invalid complaints depending on reviewing guest history files before applying *P*-chart for monitoring customer complaints and feedback to avoid mistakes during interpreting control charts and making misleading decision.

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