

A FRAMEWORK FOR SPC-BASED EMERGENCY MANAGEMENT IN HOSPITALITY INDUSTRY

Abdallah M. Elshaer^{1*}, Emad Abdelaal², Jehan El Amir³, Saleh Arous⁴, Mahmood A. Khan⁵

^{1, 2, 3, 4}, Faculty of Tourism and Hotels, University of Sadat City, Egypt

⁵Professor and Director MSBA Hospitality & Tourism Management Virginia Tech

*Corresponding Author Email: elshaerabdallah66@yahoo.com

ABSTRACT

The hospitality industry is exposed to many calamities and emergencies resulting from natural disasters and human faults or irresponsible attitude. The ascending number of emergencies refers to a shortage in emergency management policies, and the need to update emergency procedures and techniques to avoid losses in people-oriented businesses. If emergencies are not controlled, averted, or managed, destinations and hospitality organizations can experience disastrous effects. Therefore, this paper aims to provide a framework for emergency management that is based on statistical process control (SPC), which is considered as a collection of powerful problem-solving tools effective in achieving process stability and improving capability through the reduction of work-related problems. In addition, SPC tools will help in understanding the process streaming. This paper is considered a case study research paper which is conducted in an Italian Restaurant in Washington D.C. metropolitan area in the USA. In this paper, the principle of triangulation for determining validity and reliability was applied to a wide range of data collection methods. This study provides a new approach in managing emergencies that strike the hospitality industry. The introduced SPC-based emergency management framework is applicable to be used as a proactive approach in planning and managing emergencies affecting hospitality business operations. Subsequently, managers can handle emergencies effectively by applying such techniques.

Keywords: *Hospitality Industry, Vulnerability, Emergency Management, Statistical Process Control*

INTRODUCTION

Tourism is a major source of money, investment, and employment. The World Trade Organization believes that tourism can stimulate development, economic growth, and create new opportunities for poverty alleviation and self-governance. Tourism is considered an extremely labor intensive and a significant source of employment especially in developing countries that have limited livelihood options (World Tourism Organization, 2017).

In the hospitality industry for example, internationally there is an average of one employee for each hotel room. A new job created in the accommodation industry generates 1.5 jobs along the supply chain in the tourism-related economy, with a proportionate economic help to local destinations (International Labour Organization, 2010; World Tourism Organization, 1997). Since the most recent couple of decades, the hospitality industry in the world have experienced many problems and emergencies influencing the inbound tourists' movements and tourism income, making different difficulties for the private and public sectors (Prideaux, 2004).

Therefore, the emergency management must occupy a significant place on the agenda of practitioners, academics, authorities, and the business community, however, some destination managers are unaware of how to effectively mitigate or even handle the emergencies (De Sausmarz, 2005). According to Lepp & Gibson, (2008), the emergency management needs to be adopted despite its evident failure in the recent emergencies that stroke the industry all over the world with its multiplier effect on the world economy. As McKenna, (2006) claimed that the emergency management enhances organizational performance and creates value for stakeholders.

Hence, due to several parallel unfavorable events, there is growing interest in emergency management across the world to maintain the business continuity and decrease the causes and consequences of emergencies (Chan & Lam, 2013). Consequently, the shift from traditional silo approach to statistics-based emergency management will be adopted and used throughout this study. The adoption is necessary because the statistical tools are more reliable as they represent the mirror of reality more accurately.

SPC is an analytical decision-making approach which allows you to see when a process is working correctly and when it is not. Variation is present in any operation, deciding when the variation is natural and when it needs correction (Hart & Hart, 2007). Therefore, the main objective of this paper is to introduce SPC-based EM in the hospitality industry. It will also determine the antecedents (the hospitality industry-related stakeholder's role) of emergency management implementation.

LITERATURE REVIEW

Resilience in Hospitality Sector: Do We Live in an Increasingly Emergency Prone Environment?

An emergency is any situation or series of events and situations that launch people or organizations into a downward spiral, by threatening to harm group, team or property and negatively impact and damage the business, its stakeholders, or even an entire industry if not handled effectively and efficiently, characterized by "severe consequences, low probability, ambiguity, and decision-making time pressure," (Hale, Dulek & Hale, 2005), and always creates three inter-related unpleasant consequences: public safety, financial loss due to disruption of operations and loss of market share, and inevitably destroy reputation, because it reflects poorly on an organization (Coombs, 2012). Tourism is especially vulnerable to different emergencies and, being fragmented, often its response is difficult to initiate and coordinate. Even though articulation with other sectors is crucial, it is important to recognize that tourism and hospitality industries' characteristics are unique.

According to Wang & Ritchie (2013), the tourism and hospitality industries comprise a wide array of characteristics that make them highly vulnerable to emergency situations. For example,

- Problematic (unique) characteristics of hospitality operations and characteristics themselves (Rachera & Hu, 2009):
 - Intangibility –products/destinations cannot be tested or touched prior to purchase,
 - Perishability –inventory cannot be carried or stored away for using later,
 - Volatility –depending on a wide range of external motivators.
- Many tourism destinations and accordingly hospitality properties are in areas of suburban and natural beauty where there are greater risk and danger

and natural disasters often hit (high risk and exotic) such as coastlines, mountains, rivers and lakes.

- The tourism industry is only about people and this maximize the consequences of unpleasant actions, especially such exogenous events as economic, social, and political issues bring unpleasant consequences. In specific, the industry is highly people-oriented with both tourists and employees being highly vulnerable to the disasters that can hit tourist destinations. Many humans' lives are at stake in tourism destinations and organizations, and the devastation can be extensive.

- Tourists are there only for joy, accordingly they are less familiar with local threats and the resources to help them avoid risk. In addition, they come from different cultures and backgrounds, accordingly, their behavior is unpredictable and therefore harder to control in case of emergencies.

In general, the tourism and hospitality industries are fragmented and so it does not easily mitigate the emergencies. This also stresses the need for an integrated emergency technique across the industry that is available for all types of enterprises to avoid emergency situations. Developing a culture of emergency awareness and preparedness strategy is vital for all types of organizations involved in the industry both during and after the disaster (Faulkner, 2001), to be better positioned to anticipate and manage emergencies, thereby rebounding quickly from any emergency situations. Ritchie (2004), along with other researchers suggests the need for an information cooperation team to help aid recovery.

According to Gundel (2005), the emergency classification is the first step to keep them under control as it facilitates the analyzing and planning processes of emergency actions. There are two broad classifications of tourism-related emergency: those beyond the control of managers (either in the public or private sector) such as natural disasters, disease epidemics, and sudden global economic, and those resulting from a failure of management to put in place contingency measures to deal with predictable emergencies (Tse, So & Sin, 2006; COMCEC, 2017) indicate human-made emergencies that became more frequent and complex than before, affecting tourism and hospitality industry and related dependent industries (Pforr, 2006) such as poor management, loss of data, inappropriate strategic management, massive turnover, service or equipment failure, financial fraud, destruction of place of business, crime waves, acts of war or terrorism, political upheavals, and anthropogenic climate change. Such

multiple and frequent emergencies affect the business' reputation and lead the business eventually to lose its share of the market.

Enhancing the industry' ability (Resilience) to reduce the chances of occurring the emergency events, mitigate the impacts of emergency, and recover its essential structures and functions quickly depend on different forms of capital built up in the phases before the event. Cochrane (2010) developed the concept in the context of tourism as “the sphere of tourism resilience”, with the core features of a resilient system being:

- Leadership normally provided by the public sector.
- The ability to understand and classifying the risks that threaten the business.
- Collaboration between stakeholders to create strong networks.
- Enough flexibility to adapt to new techniques assisting in mitigating such events.

Hence, along the same lines demanding effective cooperation, accurate analytical and control tools must be adapted when preparing and dealing with emergencies.

Statistical Process Control (SPC)

The foundation for SPC was formed by Walter Shewart working in the Bell Telephone Laboratories in the 1920s conducting research on methods to enhance the performance and lower costs. He developed the concept of control about variation to determine if the process is operating at an acceptable level or not. In this era, it becomes increasingly apparent that decisions must be made based on facts, not just claims and suggestions (Saunders, Lewis, & Thornhill, 2009). Consequently, data must be gathered, tabulated and analyzed. This is where SPC tools come in to help in the decision-making process and determining if the process is under control or not. According to Parkash, Kumar & Rajoria, (2013), SPC is the technique of statistical methods to the monitoring and control of a process to ensure that it operates at its full potential to produce perfect outcomes. Under SPC, a process behaves predictably to produce as much conforming process procedures as possible with the least possible waste. SPC is formed of three words Statistics, Process, and Control which mean the following (Montgomery, 2008):

- Statistics (literally: Adjective) - A way to collect, classify and interpret numerical data (information expressed in numbers).

- Process (literally: Process) - A combination of procedures, methods, equipment, people, raw materials and environment that produces a product.
- Control (literally: Management) - Directing or regulating the procedures and inventing rules that ensure its success.

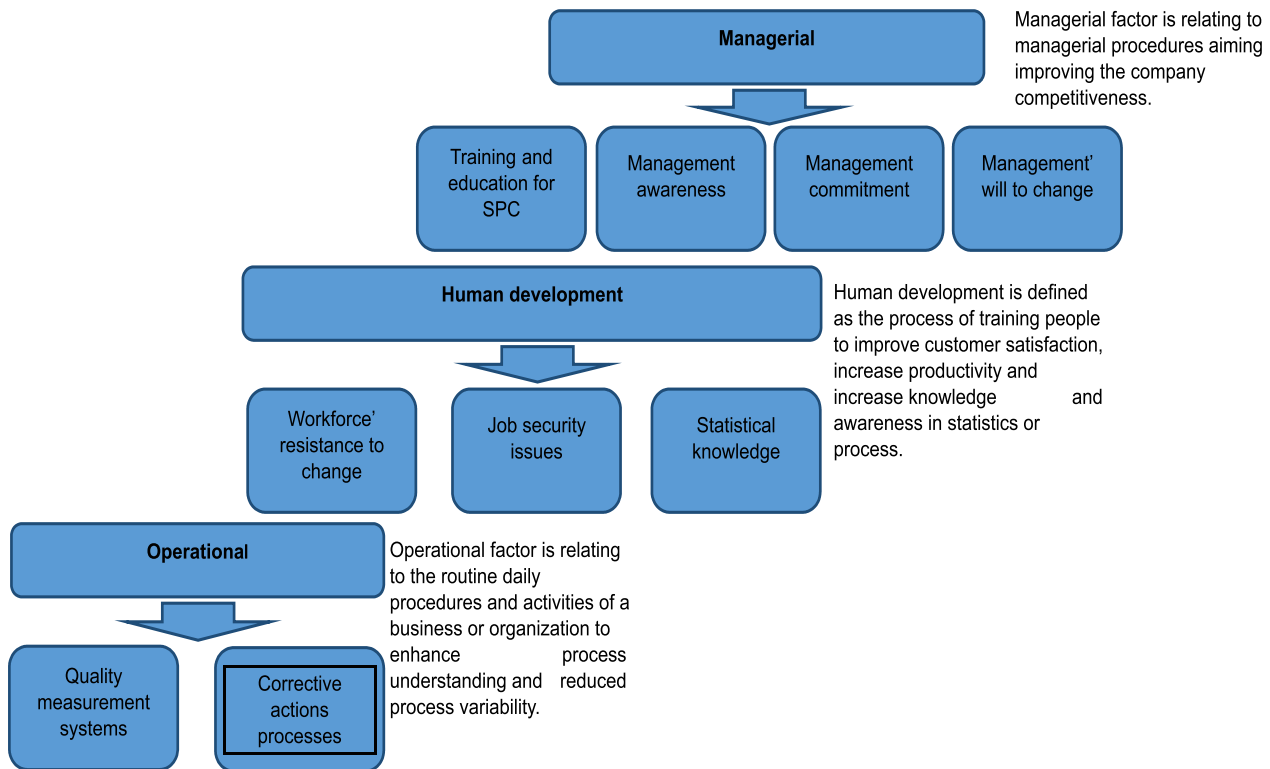
According to Pyzdek (2003), SPC is also defined as a management philosophy that is based on straightforward statistical tools to identify and solve process problems by systematically exploring potential risks and threats in process control in a way that help managers to proactively behave and make corrections before outcomes suffer (Pyzdek, 2003). Then, SPC is the use of numerical data to direct or regulate the methods used to get perfect outcomes by measuring whether their systems and procedures conform to security and safety specifications or not.

Despite the enormous writing on SPC regarding predominantly statistical factors (selection of control chart, construction of control chart, and design of new types of control chart), there is little academic production that offers practitioners complex methodology for implementing SPC as a problem/default/defect – detecting process. Some publications shed the light on methodical aspects and another stress on organizational aspects of the implementation of SPC. In a significant effort Gordon *et al.*, (1994) offered a statistics-based analysis of successful implementation' factors of SPC. They analyzed some factors such as top management commitment, training programs, responsibility for worker training, and involvement of workers. They concluded that quality issues are addressed best when human factor is fully engaged in the problem-solving process. But unfortunately, they didn't investigate SPC as a problem-solving process deeply. Another conceptual framework for the SPC implementation is presented by (Antony & Taner, 2003) which covers the steps such as construction of control charts and interpretation of control charts, but also this suggestion suffers from the same problems as the previous one – it offers only general well-known information about construction and interpretation of control charts. However, Dasgupta (2003) offered a comprehensive framework for the SPC application with the special emphasis on the identification of the sources of the potential emergency causes. He differentiated the activities linked to the identification of assignable cause according to the common stages of the control charting. Overall, SPC implementation issues are solved in many several papers. However, the data about SPC implementation in hospitality industry is very limited and is concentrated in

food industry. SPC implementation in food industry is proposed with reference to the 3 main factors as shown in figure 1. The sarcastic implementation of SPC in tourism

and hospitality industry enhance the importance of this paper that aim to improving the above three factors collectively.

Figure 1: SPC Implementation in Hospitality Industry



Source: The researchers based on Yumus, Taib & Iten, 2016

The SPC tools will help to understand better the process, as analyzing the defects is the most common role of SPC tools to identify the deviation causes and sources and consequently tracking them and eliminating the assignable causes. So, SPC is powerful technique of problem-solving tools useful in achieving process stability by avoiding emergencies and improving the process capability through the reduction of variability.

RESEARCH METHODOLOGY

This paper is considered a case study research paper which examines a person, place, event, and phenomenon to extrapolate key themes and results that help predict future trends, illuminate previously hidden issues/emergency situations that can be precisely investigated, and/or provide a means for understanding an important research problem with greater clarity. Consequently, a case study design was the most appropriate qualitative method for this paper. The data collection methods used in this study were a checklist and an interview with the service staff.

This case study used an Italian Restaurant in Washington

D.C. metropolitan area in the USA. This restaurant was selected due to its advantageous location in Georgetown, a popular restaurant site, in addition to its high seating capacity (200 seats) and customer count as well as employed servers and busboys. It is the amount of work pressure; serving large number of customers, and intensive customer-server interaction made this restaurant as appropriate site for observing potential real emergencies, providing holistic view of how restaurant's management deals with or mitigate unfavorable situations. It is noteworthy that one of the authors worked as a busboy at the restaurant to gain insightful and accurate information. Thus, observation include real situation related to food services, servers, and entire environment.

Data Collection Methods and Instruments

In this paper, the principle of triangulation for determining validity and reliability was applied to a wide range of data collection methods. The paper was divided into three phases as shown in Table 1. Only one restaurant and their workers were selected as an example of testing the checklist rather than as a broad empirical study.

Table 1: Data Collection Methods and Purpose

PHASE	METHOD	TOOL	PURPOSE
The first phase	Direct observation	Checklist	Capture the staff attitudes during encountering operations' troubles and emergencies which reflects the degree of emergency awareness.
The second phase	Interviewing	Structured, in-depth form	Confirming what has been observed in the first stage (trustworthiness of findings) in addition to the emergencies that the staff faced and how they responded and their evaluation of the stakeholders' role in such emergencies.
The third phase	Modelling	Document analysis	Introducing SPC-based emergency management model in the hospitality and tourism industry.

RESULTS

The first tool used in this paper was the checklist, which consisted of three main parts. Under each part, a series of items were included that represented criteria for evaluating the component's characteristics, as shown in table 2. Observations were systematically recorded. This process was conducted three times a week in August which gave a total of 12 times to be analyzed. Direct observation helped in answer many questions concerning the three assessment elements mentioned in table 2. The formula that is adopted to calculate the number of points for every section in the checklist is based on Weighted average equation which is an average in which each observation in the data set is assigned or multiplied by a weight before summing to a single average value. The advantage of direct observation was that it assisted in actual recording of the restaurant's efforts towards emergency management.

Table 2: The Calculated Values Based on Checklist Analysis

Assessment Elements	N	N/A	The sum of Points	Percent %	Evaluation
Adopting Emergency Management Procedures (120)	(2×0) + (4×0.3)	0.2	120	20	Poor
Training Efforts for preventing or controlling the restaurant's emergencies (30)	(2×0) + (1×0.3)	0.1	30	10	Poor
Involving all the stakeholders in mitigating the restaurant's emergencies (120)	(3×0) + (2×0.3) + (1×0.6)	0.2	120	25	Poor

The empirical analysis of the checklist data revealed by several indicators that there is no one straight or obvious concept when dealing with emergency situations or any preparedness' procedures for such events, the results were as follows:

- The first section: the logic steps to prevent problems were not followed, especially those related to staff members.
- The second section: the results were negative; there was no training program or meeting for both the staff and the stakeholders related to preventive emergency techniques.
- The last section: the results showed that they may charge their suppliers or vendors financially for any delay or for any deviation from the specified quality or quantity. The restaurant management appeared to be more, cost-minded in management and not saving life or preventing emergency situations.

Subsequently, the management never devised plans or rules to increase the awareness for the need to proactively reduce the chances for any potential emergencies.

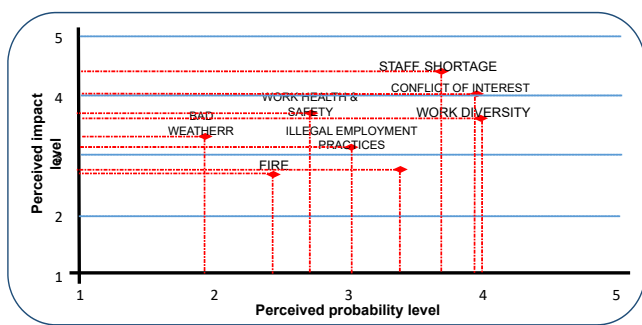
The second tool used was conducting interviews. Staff experience and their perceptions were captured by conducting individual interviews with the service providers (servers and busboys). Eleven interviews were conducted using seven restaurant servers and four busboys. Individual interviews were conducted before their shift opening and not during work hours. This was done to avoid interruption during their work schedule. The reason for the individual interviews was to get information from the participating staff themselves, thereby ensuring getting relevant and credible data. First, the interview aimed at assessing the respondents' awareness and preparedness for the emergency that may threaten the restaurant. The resultant data are presented in table 3.

Table 3: The Results of the First Two Introductory Questions

INTERVIEWEE	Not at all 1	In need of improvement 2	Neutral 3	Good 4	Excellent 5	Average
How would you rate the Emergency Awareness within the restaurant?						
SERVERS	3,36 %	47,12 %	33,00 %	16,52 %	0 %	2,61
BUSBOYS	0 %	41,43 %	24,29 %	30,42 %	3,86 %	3,02
How would you rate the Emergency Preparedness within the restaurant?						
SERVERS	2,50 %	46,25 %	40,00 %	10,00 %	1,25 %	2,23
BUSBOYS	1,45 %	40,58 %	24,64 %	30,43 %	2,90 %	2,93

The main aim of the interview was to make a good use of the staff experience to focus on one or more issues that frequently face the restaurant and to capture their emergency awareness and preparedness. The results of the previous table 3 confirmed what was obtained by the checklist form concerning the application of the relevant procedures. Also, the respondents considered the emergencies related or created by the human factor as the most frequent possibility and, they expressed its effects as “destructive factors”. They pointed staff shortage, conflict of interests, and work diversity as the work-related problems.

Figure 2: Respondents' Perception of Probability and Impact Levels during Emergencies



As shown in figure 2, the impact of an event on the restaurant business may be analyzed from the viewpoint of its human resources effect (the restaurant is unable to conduct its business at the set parameters because of the lack of qualified employees, etc.), of operational costs (costs incurred for the work accidents the employees were involved in), of legal effects (what the legal consequences of the emergency situations are).

Because of the evaluation of figure 2, Human resources-related emergencies (e.g. Staff shortage, conflict of interests, work team diversity issues, etc.), Operational and Illegal Issues are rated also as major threats to our X restaurant. Man-made emergencies or human-related emergencies (staff shortages, workplace diversity, and conflict of interests) are rated as emergency types with the highest generally perceived probability level. One possible explanation for this phenomenon might be the fact that the pressure/volume of the work and their respective effects make a lasting impression on the respondents' memory. The graphics illustrate another interesting result: None of the defined crisis types is rated as “not probable at all” or “rather not probable” on the one hand neither are they rated as “no impact at all” or “rather no impact” on the other hand. This is a clear indication that emergency situations and their impact within the restaurant are generally inevitable. Therefore, the need of a unique emergency management process can't be denied.

The third phase requires applying the suitable SPC tools on the most frequented emergency that affect the work flow of the restaurant.

The following table 4 shows the emergency inventory of the examined restaurant which help the restaurant management to identify the domain/category of emergencies that has the most exposure, and the emergency score including a numerical assessment of the likelihood and impact.

Table 4: Emergency Inventory

Rank	Emergency	Emergency Domain	Likelihood	Impact (Low 1 - High 5)	Emergency Score/ Ranking
1	Labor Shortage	Human Resource	25.18	3.97	100 (Very High)
2	Difficulty of Recruiting and Retention	Human Resource	25.18	3.90	98.22 (Very High)
3	Language Issue	Operational	13.33	4.81	64.12 (High)
4	Business Management	Operational	13.33	4.30	57.31 (High)
5	Conflict of Interest	Strategic	12.59	3.87	50.11 (Medium)

Based on the results of the previous table 4, it appears that human induced emergencies are evident possibilities therefore, the need for using SPC tools. Considering the scenario from the restaurant case, the use of SPC tools are described below, with the highest focus on the negative impact on the functioning of the operation resulting from the staff shortage.

DISCUSSION

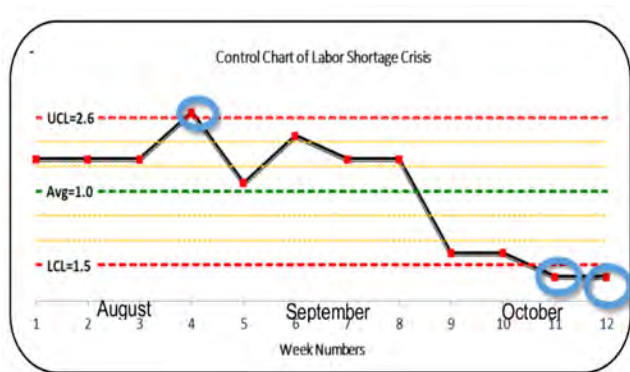
Adopting SPC Tools in mitigating the X restaurant's emergencies.

A control chart helps determine whether variations in the selected restaurant process are due to emergencies or crisis with the product or extraneous circumstances such as employee shortage. The following control chart is a graph used to study how staff shortage changes over time. Data are plotted in time order. The chart has a central line for the average which is accepted to be one member of service staff extra or less every week, the upper value for the upper control limit is determined as 2.6 members of service staff, while, the lower value that is determined for the lower control limit is 1.5 members of the service staff every week. These lines are determined from historical data.

By comparing current data to the specified lines which can be translated as following:

- UCL = 2.6 member of service staff (over),
- LCL = 1.5 member of service staff (less).

Figure 3: Control Chart of Staff Shortage Crisis



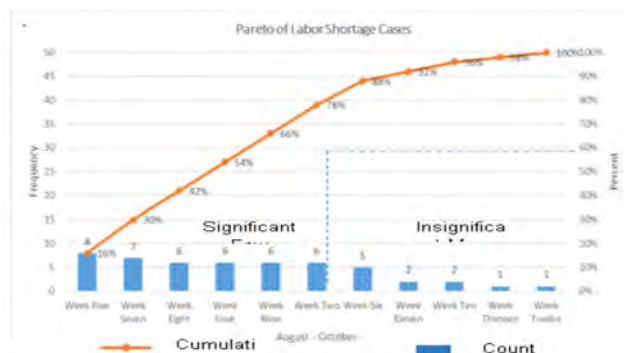
Generally, the previous chart shows that the process is out of control, it shows that the restaurant suffers from shortage in service staff, where there at least two servers and two busboys are required at four points as showed in the chart which means the restaurant is needed to be provided with extra service employees in weekends especially in October. Consequently, the process variation is unpredictable (out of control), because of the restaurant is experiencing shortage especially in the holiday months as the shortage occurred every week and went beyond the upper limit in the last week of August to hit shortage of more than three workers while the rest of line movement indicates that there is a shortage of a round one or two. On the other hand, the restaurant experienced over staffing in the last two weeks of October.

Using a control chart shows the effects of alterations to the process and helps correct any errors in real time. It also helps in predicting the range of possible future impacts.

The next possible enquiry is based on where and when the identified emergency “labor shortage” arose. A Pareto chart is a basic quality tool that helps in identifying the most frequent complaints, emergencies or any other factor can be used for this purpose. According to the “80/20 rule”, the chart shows that week's 5, 7, 8, 9, and 2 are the weeks that experienced staff shortage in the restaurant under study.

The full capacity of the restaurant is 200 seats. When the restaurant is operating at its full capacity with the current number of servers which is 11, staff shortage crisis will happen inevitably as there will be many tables in every section for every server, obviously an exaggerating number of tables for the server. Pareto chart was constructed based upon data collected by check sheet and shown in the following figure 4.

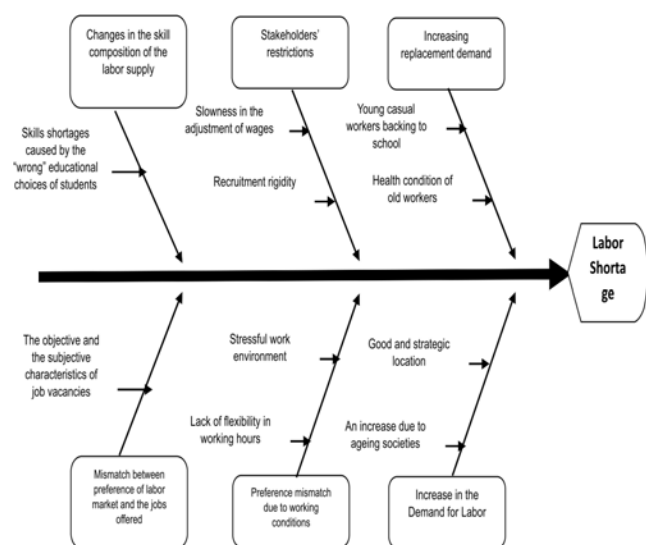
Figure 4: Pareto Chart of X Restaurant Staff Shortage



The figure reveals that the weeks in September is the vital problem week and represents around 80% of the total cumulative percentage of peak periods (staff shortage weeks) so that most troubles can prop up in September. August and October are considered as “Useful Many” and represents around 20% of the total cumulative percentage.

After exploring the emergency that came at the top of the emergency list, the cause and effect tool can help in stating the different probable sources of emergency. The following diagram 1 provide an overview of the most common causes of staff shortage in the restaurant under study, the data derived from the observation process and the individual interviews with the staff, in addition to the brainstorming technique based on the overall status of the restaurant industry in the USA.

Diagram 1: Cause and Effect Diagram (Fishbone)

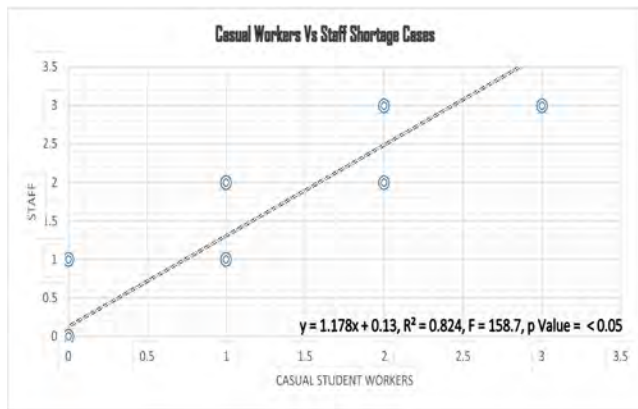


After realizing the different causes that may be responsible for the existence of the emergency to scatter diagram, was constructed to find the relationship

between the two variables; scatter diagram the degree of correlation between the existing emergency (labor shortage crisis) and every potential cause captured by the fishbone diagram.

The shape of the scatter diagram indicates what type of relationship may exist between the two variables. The scatter diagram clarify that a direct relationship exists between the increased number of casual workers and the staff shortage. Scatter diagram shows that there is a positive relationship between the high number of casual student workers and the staff shortage. Also, the equation of the diagram shows that R2 is 0.82 which means the existence of casual student workers is responsible for 82 % of the crisis.

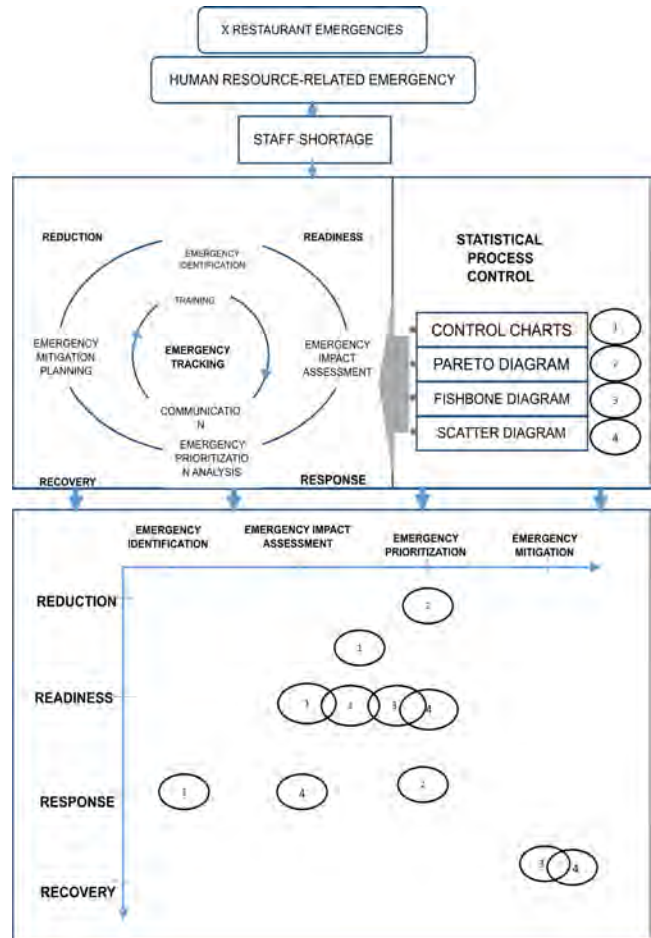
Figure 5: Scatter Diagram of X Restaurant's Casual Workers



Therefore, the restaurant management should re-evaluate the existing hiring procedures (the logical first step to fill vacancies is not only to increase but also to improve recruiting efforts and practices) to avoid such unpleasant situation which affect significantly on the restaurant's operations and ends with losing the reputation and consequently the customers.

Hence, there is a necessity in the selected restaurant to hire those who have family responsibility and then satisfy them with a suitable pay to increase their loyalty and eventually reduce the high rate of their turnover to mitigate occurring an emergency due to labor shortage. In addition, there is a necessity in the restaurant to introduce ongoing education and training programs of management and line staff on interrelation between SPC tools and its implementation steps. Although the restaurant has the capacity to plan pre-emergency methods to help with emergency management, it is frequently not able to keep an emergency from happening. This is due to the attitude (resistance) of the management.

Figure 6: Adopting SPC Tools in Mitigation Process of the Selected Restaurant's Emergencies



Basically, the genuine test is to perceive emergency in an opportune manner and actualize adapting techniques to restrict their harm. Figure 6 shows how SPC tools are emerged into emergency management so that it can be used as guide for introducing a framework for SPC – based emergency management in the hospitality and tourism industry.

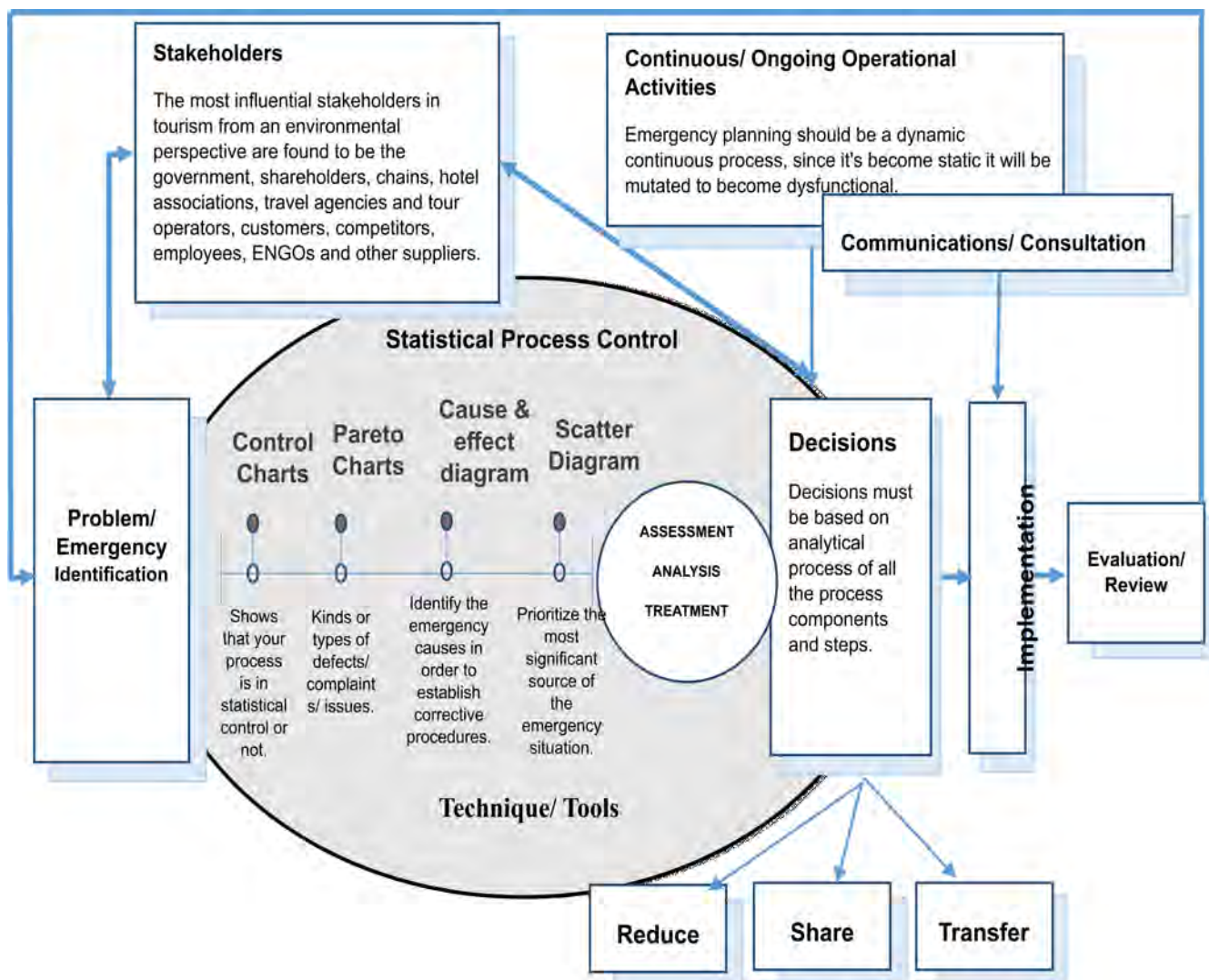
Simply, we can use some SPC tools (the adopted tools in our case) in the daily operations as alert system whenever a significant process change occurs, as following:

- Control chart shows that the process is out of control (if there is any deficiency or problem) or not.
- Pareto diagram identifies that the September is the vital month that need attention because of the notable staff shortage.
- Sources of shortage causes were assigned to many sources according to the cause and effect diagram (fishbone diagram).
- Scatter diagram proves that there is direct relationship between casual workers and staff shortage crisis

especially about the number of restaurant staff. Then, SPC tools may permit early reporting on process performance and may be used to assess the need for a summative evaluation before such an evaluation is

undertaken. Deploying statistical process control is a process, requiring organizational commitment across functional boundaries and continuous cooperation with the different stakeholders to take a decision based on SPC technique as shown in the proposed framework in figure 7.

Figure 7: SPC- based EM Framework



Source: The Researchers' Analysis

CONCLUSION

This study utilized a wide range of data collection methods (triangulation principle) to introduce SPC-based EM in hospitality industry. In real, the case for using statistical methods for monitoring service processes and operations appears unassailable in the hospitality industry. However, in practice, SPC-based EM reveal what's going on in operation system in real time, they allow operators to detect and correct issues before they cause deeper problems in processes and products.

Its tools showed flexibility to be applied in service operations. So, hospitality properties should endeavor for the execution of SPC tools for emergencies mitigation. It is just as important to know when your process is running smoothly as it is to know when something is wrong. SPC is not difficult, complicated or expensive. Therefore, such management is considered a proactive approach through the utilization of statistical tools in administration will help lessen danger, time wastage, poor asset administration and diminish the effects of those that do emerge. To conclude, SPC-

based EM should be adopted and reinforced by the involved stakeholders' commitment. Such adoption should happen before emergency events occur, rather than diagnosing them after they have occurred; to improve the future rather than simply measuring the past.

ACKNOWLEDGMENT

The corresponding author is thankful to the Egyptian Missions Authority for funding and to Virginia Tech University - USA for hosting him as a visiting scholar to accomplish his PhD.

REFERENCES

- Antony, J. & Taner, T. (2003). A Conceptual Framework for the Effective Implementation of Statistical Process Control. *Business Process Management Journal*, 9(4), pp 473-389.
- Chan, E.S.W. & Lam, D. (2013). Hotel Safety and Security Systems: Bridging the Gap Between Managers and Guests. *International Journal of Hospitality Management*, 32, pp 202-216. DOI: 10.1016/j.ijhm.2012.05.010
- Cochrane, J. (2010). The Sphere of Tourism Resilience. *Journal of Tourism Recreation Research*, 35(2), pp 173-186. DOI: <https://doi.org/10.1080/02508281.2010.11081632>
- Coombs, W. T. & Holladay, S.J. (2012). *The Handbook of Crisis Communications*, 1st Edition. Blackwell Publishing. US.
- Dasgupta, T. (2003). Maximizing the Effectiveness of Control Charts: A Framework for a Reacting to Out-of Control-Signals. *ASQ Annual Quality Congress Proceedings*, pp 327-337.
- De Sausmarez, N. (2005). Crisis Management for the Tourism Sector. *Journal of Tourism and Hospitality Planning and Development*, 2(1), pp 55-59.
- Faulkner, B. (2001). Towards a Framework for Tourism Disaster Management. *Tourism Management*, 22(2), pp 135-147. DOI: 10.1016/s0261-5177(00)00048-0
- Gordon, M.E., Philpot, J.W., Bounds, G.M. & Long, W.S. (1994). Factors Associated with the Success of the Implementation of Statistical Process Control. *The Journal of High Technology Management Research*, 5(1), pp 101-121. DOI: [https://doi.org/10.1016/1047-8310\(94\)90016-7](https://doi.org/10.1016/1047-8310(94)90016-7)
- Gundel, S. (2005). Towards a New Typology of Crises. *Journal of Contingencies and Crisis Management*, 13(3), pp 106-115. DOI: <http://dx.doi.org/10.1111/j.1468-5973.2005.00465.x>
- Hale, J.E., Dulek, R.E. & Hale, D.P. (2005). Crisis Response Communication Challenges: Building Theory from Qualitative Data. *International Journal of Business Communication*, 42(2), pp 112-134. DOI: <https://doi.org/10.1177/0021943605274751>
- Hart, M.K. & Hart, R.F. (2007). *Introduction to Statistical Process Control Techniques*. 1st Edition. Oregon Software, Inc, Corvallis.
- International Labour Organization. (2010). Developments and Challenges in the Hospitality and Tourism Sector. Issues paper for discussion at the Global Dialogue Forum for the Hotels, Catering, and Tourism Sector. 23-24 November, Geneva. Retrieved from: https://www.ilo.org/wcmsp5/groups/public/@ed_norm/@relconf/documents/meetingdocument/wcms_166938.pdf
- Lepp, A. & Gibson, H. (2008). Sensation Seeking and Tourism: Tourist Role, Perception of Risk and Destination Choice. *Tourism Management*, 29(4), pp 740-750. DOI: 10.1016/j.tourman.2007.08.002
- McKenna, E. (2006). *Business Psychology and Organizational Behavior: A Student's Handbook*, 4th edition. Psychology Press, New York.
- Montgomery, D.C. (2008). *Introduction to Statistical Quality Control*. 6th Edition. John Wiley and Sons. U.S.
- Parkash, V., Kumar, D. & Rajoria, R. (2013). Statistical Process Control. *International Journal of Research in Engineering and Technology*, 2(8), pp 70-72.
- Pfarr, C. (2006). Tourism in Post-Crisis is Tourism in Pre-Crisis: A Review of the Literature on Crisis Management in Tourism. Working Paper Series: no. 2006:1, Curtin University of Technology, School of Management. Retrieved From: <https://espace.curtin.edu.au/handle/20.500.11937/36215>.
- Prideaux, B. (2004). The Need to Use Disaster Planning Frameworks to Respond to Major Tourism Disasters: Analysis of Australia's Response to Tourism Disasters in 2001. *Journal of Travel and Tourism Marketing*, 15(4), pp 281-298.
- Pyzdek, T. (2003). *The Six Sigma Handbook: The Complete Guide for Greenbelts, Blackbelts, and Managers at All Levels*. 2nd revised Edition. McGraw-Hill, New York.
- Racherla, P. & Hu, C. (2009). A Framework for Knowledge-Based Crisis Management in the

- Hospitality and Tourism Industry. *Cornell Hospitality Quarterly*, 50(4), pp 561-577. DOI: <https://doi.org/10.1177/1938965509341633>
- Ritchie, B.W. (2004). Chaos, Crises and Disasters: A Strategic Approach to Crisis Management in the Tourism Industry. *Tourism Management*, 25(6), pp 669-683. DOI: <https://doi.org/10.1016/j.tourman.2003.09.004>
- Saunders, M.N.K., Lewis, P. & Thornhill, A. (2009). *Research Methods for Business Studies*. 5th edition. Pearson. US.
- The Standing Committee for Economic and Commercial Cooperation of the Organization of the Islamic Cooperation (COMCEC). (2017). Risk and Crisis Management in Tourism Sector: Recovery from Crisis in the OIC Member Countries. Retrieved from: http://www.tourismdev.com/Risk_and_Crisis_Management_in_Tourism_Sector_Recovery_from_Crisis_in_OIC_Member_Countries/Default.1118.html
- Tse, A.C.B., So, S. & Sin, L. (2006). Crisis Management and Recovery: How Restaurants in Hong Kong responded to SARS. *International Journal of Hospitality Management*, 25(1), pp 3-11. DOI: 10.1016/j.ijhm.2004.12.001
- Wang, J. & Ritchie, B. (2013). Attitudes and Perceptions of Crisis Planning Among Accommodation Managers: Results from an Australian study. *Safety Science*, 52, pp 81-91. DOI: 10.1016/j.ssci.2012.02.005
- World Tourism Organization. (1997). *International Tourism: A Global Perspective*. 1st Edition. World Tourism Organization (UNWTO), Madrid, Spain. Retrieved from: http://www.ontit.it/opencms/export/sites/default/ont/it/documenti/archivio/files/ONT_1997-01-01_00959.pdf.
- World Tourism Organization. (2017). *Tourism and Poverty Alleviation*. World Tourism Organization Madrid, Spain. Retrieved from: <http://step.unwto.org/content/tourism-and-poverty-alleviation-1>.
- Yunus, M.F.M., Taib, C.A. & Iten, R. (2016). A Preliminary Study on the Application of Statistical Process Control (SPC) Towards Process Efficiency: Case Study in Food Industries. *Sains Humanika*, 8(4), pp 25-31. DOI: 10.11113/sh.v8n4-2.1055