SIX SIGMA APPLICATIONS ON CALL OPERATION PROCESS: A STUDY

OF THE ATTENDANT CONSOLE

SHEFEEQU REHMAN K. V & ANKUR SHARMA

[1]Assistant Professor, Department of Business Administration, Aligarh Muslim University,

Malappuram Centre, Kerala, India

[2]Student of Masters in Business Management, Department of Business Administration, Aligarh Muslim University

Malappuram Centre, Kerala, India

ABSTRACT

The study was conducted at the Attendant Console at one of the Hospitals in India. The call operations process at the Attendant Console was considered for the same. The Six Sigma technique is applied at the Hospital level for improving the effectiveness of the call operations. It is achieved by reducing the number of returned calls and the holding time at the Attendant Console. The Attended Console receives many calls daily for the service. All calls are handled centrally by the call operator/s at the Attendant Console and connect to concerned individuals or Departments in the hospital. Many customers had complained about long waits when they were calling for the service at the hospital. This study deals with hospital's inability to answer the customer calls effectively. The Attendant Console receives approximately 1400 calls in a day. The call operators spend their 25200 seconds in holding the call and 1260 seconds in handling the returned calls. The study finally helped to reduce the total holding time by 14000 seconds and also saved the time due to zero returned calls by 1260 seconds which resulted in overall improvement of call operation process by 21.8%.

KEYWORDS: Six Sigma, Pareto Chart, Ishikawa Diagram, Attendant Console, Holding Time & Returned Call

INTRODUCTION

The study was conducted in the field area of operation process. It was conducted at the Attendant Console at one of the Hospitals in India, to improve the effectiveness of call operations by reducing the number of returned calls and the holding time at the Attendant Console. The quality technique, Six Sigma (DMAIC), was applied for the same. The Success of the DMAIC cycle is because of many reasons and one of the reasons is the effective use of relatively small set of tools (Montgomery).

Confidentiality Declaration

To comply with the Hospital's (where the study was conducted) confidentiality requirements, the identity will not be disclosed. Any references made to the Hospital will be referred to as ―The Hospital.

The Existing Call Attending Process at the Hospital

A telephone operator is responsible for sending and receiving phone calls from clients. They provide assistance to the customers and direct phone calls to the concerned departments/sections. This job requires good communication and multitasking skills.

- The caller dials the telephone number of hospital and at the Attendant Console the call operator receives the call.

- The operator greets the dialer and asks for assistance that the customer seeking for.

- The caller may ask for service from particular individual or department.

- Operator transfers the call to that Department or Individual.

- Finally the caller will communicate to desired Department or Individual.

- If the receiving party does not pick the caller's call then the call returns to the call operator.

- Now the operator convey that currently the service cannot be provided due to the absence of concerned person at the Department.

The flow chart shows the current procedure of call attending at the Attendant Console at the Hospital. When customer dials hospital's number it connects to Attendant Console, if the call operator attends the call then the process goes further, otherwise the customer feel disappointed. After receiving the call, the operator greets and asks for assistance and transfer the call to the concerned department.

The receiving party in the concerned department attends the customer's call and provides the required service. But in other case when receiving party does not attend the customer's call due to various reasons then the call returns to the operator, where the operator gives him a message that the concerned person is not available at this time and ask for any other assistance. In this way the communication takes place at Attendant Console at the Hospital.
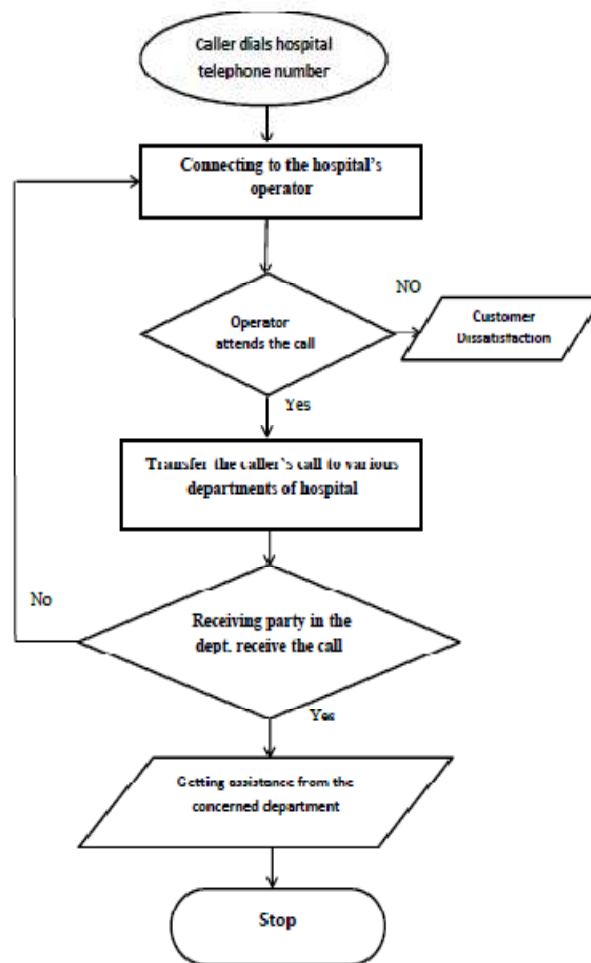

Figure 1: Flow Chart: Current Call Attending Procedure

Define Phase

Six Sigma Project Charter

Initiator's Name: Mr. Shefeequ Rehman K V& Mr. Ankur Sharma.

Project Title: "Six Sigma Application on Call Operation Process: A Study of Attendant Console".

Project Purpose: Reduce the number of returned calls and holding time at Attendant Console and thereby increasing the call effectiveness.

Problem Statement: The Attended console receives many calls daily for service. All calls are handled centrally by the call operator/s at Attendant Console and connect to concerned individuals or Departments. A number of customers had complained about long waits when calling for service. This study deals with hospital'sinability to answer customer calls effectively.

Need of The Study: Improve the effectiveness of call operations at Attended Console and reduce the number of returned callsand the holding time at the Hospital.

Objectives Need Addressed:

- Reduce the holding time of calls.

- Reducing the number of call returned to call operator/s.

- Increasing the call effectiveness at Attendant Console.

Scope: Limited only to the Attendant Console at the hospital.

Roles & Responsibilities:

Stake Holders: The customers who call at Attendant Console for service at the hospital.

Sponsors: Administrative Department, The Hospital.

Team Members: Attendant Console, Call operators and the employees of Front office.

Project Success Measures / Benefits/ Deliverables:

- Zero returned call

- Holding time reduced per call.

- 21.8% overall improvement in call operation process at the Attendant Console.

Measure Phase

Data Collection

The data is collected through the interview of operators and the other employees at the Attendant Console and the Front Office. It is found that the Attendant Console department receives approximately 1400 calls per day. Out of which 60% calls are the internal calls and the rest 40% calls are external calls. Here the internal call means call with in the hospital i.e from one department to another department. And the external call represents call from the outside of the hospital. Out of 1400 calls, average 10% call are missed by the operators due to various reasons, and approximately 5% calls returns again to the operator at the Attendant Console when the concerned receiving party at the hospital misses the

call. As per the data received, 90% customers have to wait for 18 seconds (average) holding time per call and in more than 30% cases customers gets an operator busy tone. Normally an operator takes maximum 70 seconds and minimum 30 seconds to answer a call. So the average length of a call is taken as 50 seconds.

The Attendant Console has a high traffic of calls in the morning shift, from 9am to 12pm. Many customers call for an appointment with the doctors in this time period. So these hours are known as the peak hours. In the peak hours, the Attendant Console receives more than 30% calls of total calls in a day. The data related to the calls received at the Attendant Console is shown in the table 1 given below.

Table 1: Details of Calls in a Day

Total no. calls	1400
Internal calls	840
External calls	560
No. of missed calls	140
No. of returned calls	70
Average length of a call	50 seconds
No. of calls in peak hours	540

There are two shifts of working at the Attendant Console. There are two telephones available at Attendant Console. In the first shift, there are two operators for attending the calls; they work from 9am to 5pm. In the second shift, there is only single operator who works from 5pm to 8am, as the frequency of call in the second shift is lesser than that of first.

The data related to the call operators at the Attendant Console is shown in the table 2 below.

Table 2: Details of the Call Operators

Number of Telephones		2
Number of Operators		3
Shift Timings	First shift	9AM to 5PM
	Second shift	5PM to 8AM
Number of operators	First shift	2
	Second shift	1
Break time	1st Operator	1:00- 1:30 PM
	2nd Operator	1:30- 2:00 PM

Calculations

Set A: Calculating the duration of a call:

- Average length of a call   = (Max. length + Min. length)/2

                                = (70 sec + 30 sec)/2

                                = 50 seconds.

Set B: Calculating the total holding time per day:

- This average length of a call (50 seconds) is divided into three parts-

    o   Receiving (Greeting and asking for assistance) = 15 sec.

    o   Holding (searching extension number and transferring call) = 18 sec.

    o   Ringing (average time of ringing at the Concerned Department) = 17 sec.

    Therefore, Holding time for a call   =18 sec

- Total calls received in a day   =1400
    So total holding time for a day   =1400*18

                                                                     =25200 seconds

Set C: Calculating the total time taken for answering returned calls in a day

In the case when call is not received in the concerned department, it returns to call operator. On an average 70 calls returned to the call operator in a day.

A returned call to operator takes another 18sec (average) for answering.

- Total time taken by the returned calls in day   =18*70

                                                                              =1260 seconds

Therefore, total time taken for holding and answering the returned call in a day

=25200+1260=**26460 seconds**

Analysis Phase

With the help of Ishikawa diagram (cause and effect diagram), the problem can be divided into sub causes which will be helpful in understanding and finding out the solutions for the problem.
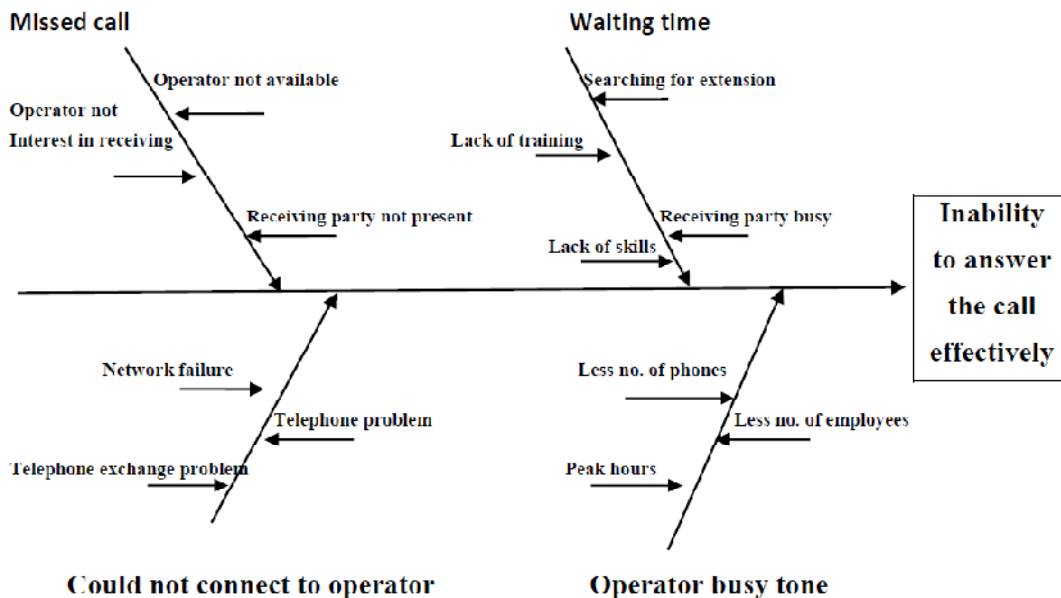

Figure 2: Cause and Effect Diagram

In the above Ishikawa diagram (Cause and Effect Diagram), all the possible causes and their sub causes are shown which results in the inability to answer the call effectively at the Attendant Console. There may be four main causes of inability to answer the call effectively. And these causes are:

- Holding (waiting) time

- Missed call

- Operator busy

- Could not connect the call

The first cause is the holding or waiting time that an operator takes in transferring the call to the concerned Department. It mainly happens due to searching the particular extension number from many paper sheets/charts. It may be because of the following sub causes:

- Receiving party is busy

- Outdated technology used for transferring the call

- Lack of skills and knowledge in operator

The second cause is the busy tone of the operator. It may be because of the following sub causes:

- Less no. of telephones

- Less no. of operators

- High call traffic specially in peak hours

The third cause is the call missed by the operator; i.e. the operator didn't attend the customer call. It may be because of the following sub causes:

- Operator is not available to receive the call

- It may be break time of the operator.

- Operator is busy in another call on other telephone

- Operator is not interested in receiving the call.

The fourth cause is the condition when the customer is not able to connect the call to the operator. It may be because of the following sub causes:

- Network problem
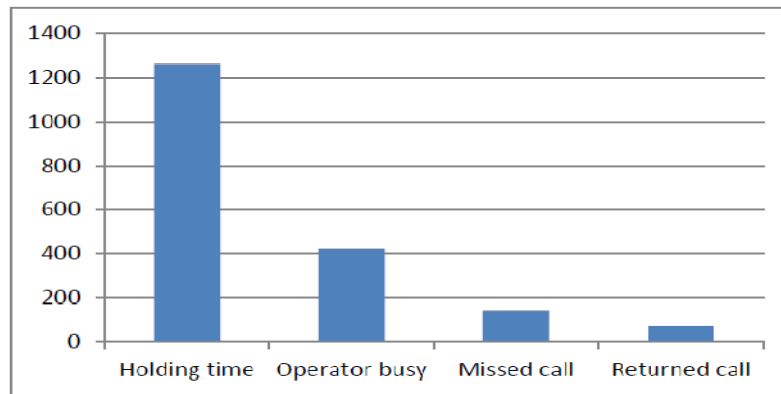
- Telephone problem

Pareto Analysis

Figure 3: Pareto Analysis

From the above Pareto diagram, it is clear that the most important reason for the inability to answer the call effectively is the holding time that an operator may take in searching the extension number and transferring the call. The second reason is the*busy tone* which the customer receives frequently whenever they dial the hospital's telephone number. Sometimes the customer's call is not attended and it is the third reason. The other reason is the returned call to the operator, when the call is not attended by the concerned Department or Individual.

The Improve Phase

As we can see from the Ishikawa diagram and the Pareto diagram that the   main reasons for the inability to answer the calls effectively are; the holding time, returned call to the operator and call operator is busy. In the improve phase, we will discuss about the ways by which these problems can be solved.

In this section, some technologies are discussed, with the help of which the operators can answer the customer's calls effectively. These technologies are as follows:

- CTI (Computer Telephony Integration)

- IVR (Interactive Voice Response)

- ACD (Automatic Call Distribution)

Computer Telephony Integration (CTI)

"The PC-based console uses CTI (computer telephony integration) to answer calls and manage call flow"(DeHaan). There arePC-based software that integrates to the PBX to streamline operations, eg; AMCOM Software(Amcom Software Inc)

"Computer Telephony Integration (CTI) is a common name for any technology that allows interactions on a telephone and a computer to be integrated or coordinated. The term is predominantly used to describe desktop-based interaction for helping users be more efficient, though it can also refer to server-based functionality such as automatic call routing.

Common Desktop Functions Provided by CTI Applications

- Screen popping - Call information display (caller's number (ANI), number dialed (DNIS), and Screen pop on answer, with or without using calling line data. Generally this is used to search a business application for the caller's details.

- Dialing - Automatic dialing and computer-controlled dialing (power dial, preview dial, and predictive dial).

- Phone control - Includes call control (answer, hang up, hold, conference, etc.) and feature control (DND, call forwarding, etc.).

- Transfers - Coordinated phone and data transfers between two parties (i.e., pass on the Screen pop with the call.).

- Call center - Allows users to log in as a call center agent and control their agent state (Ready, Busy, Not ready, Break, etc.).

Common Server Functions Provided by CTI Applications

- Call routing - The automatic routing of calls to a new destination based on criteria normally involving a database lookup of the caller's number (ANI) or number dialed (DNIS).

- Advanced call reporting functions - Using the detailed data that comes from CTI to provide better-than-normal call reporting.

- Voice Recording Integration - Using data from CTI to enrich the data stored against recorded calls" (Wikipedia).

- Therefore with the help of CTI, call routing becomes easy and operator saves time in transferring the calls to various departments.

Interactive Voice Response (IVR)

"IVR (Interactive Voice Response) offers customizable scripted voice applications to produce pre-recorded or text-to-speech prompts and menus with touchtone commands to your callers.

IVR can call patients to remind them of appointments, classes, and any message that needs to be given to them. Patients can call to hospital get in touch with their doctor's office, register for classes, renew prescriptions, and so much more"(Amtelco).

Therefore when the call is connected to concerned department or individual and if the call is not attended then instead of returning the call to the call operator, the customer may be provided with a voice message as a response which will save the time of call operator and the caller.

Automatic Call Distribution (ACD)

"ACD directs the calls to the next available and logged-in operator. The computer also tracks how long it takes until the customer is connected, how long the call lasts and the time that the operator not is working actively with calls or is disconnected because he or she has left the workstation. This eliminates the need for a central telephone operator by automatically processing the distribution of incoming telephone calls to the operators, who receive them through their headsets and seldom have to dial telephone numbers themselves, or physically pick up a telephone receiver. Increasingly, ACD systems are connected to a range of databases using Computer Telephony Integration (CTI), which allows customer records to be transmitted to an agent's computer screen along with the call"(Norman).

- "Using the ACD to improve customer service

ACD monitors calls and phone agents for user-specified time and event-based thresholds to occur. These thresholds are set so service levels can be maintained, customer service can be improved and lost opportunities can be reduced. The ACD is capable of generating data that can be compiled into reports. Reports can include call traffic, operator efficiency, average time to answer and many more.

- Skills-Based Routing

Skills-based routing is a call assignment strategy used in call centers to assign incoming calls to the most suitable agent, rather than simply choosing the next available agent. Skills-based routing is an important feature when operators are handling a variety of call types"(Amtelco).

Therefore by using ACDS, we can reduce the lost opportunities for serving the customers by suitable call operator.

Calculations

Set-D: Calculating the reduced holding time:

By using the Computer Telephony Integration (CTI), technology explained above, the holding time can be reduced.

Holding time reduced per call   =10 seconds (Approximately)

- Total holding time reduced for total call received per day   =1400*10

=14000 seconds

Set E: Calculating the Total Time Saved to Due to Zero Number of Returned Calls in a Day

With the help of IVR (Interactive Voice Response), the time taken by the returned call to the operators, for the second time service can be avoided.

Time taken by returned calls in a day =1260 seconds [From Set C]

Set F: Calculating the Total Time Saved

- So total time saved   =14000+1260 [Set D+ Set E]

=15260 seconds

Set G: Calculating the Possible Number of Calls Out of the Total Time Saved

If we convert this total saved time into number of calls then:

- Total time saved   =15260 seconds

- Average length of a call   =50 seconds

- Number of calls in saved time   =15260/50

=305 calls (Approximately)

It means for the time saved, the operator can attend another 305 more calls in day.

Set H: Calculating the improvement percentage in call attending process:

Calculating the percentage improvement in call attending process   = (305/1400)*100

= 21.8%

So, by applying Six Sigma, we improvedthe call attending process at the Attendant Console at The Hospital, by 21.8%.

Control Phase

Recommendations for the Future

- Introduce the headphone system instead of traditional hand receiver system. It will save the time in picking up the receiver each time as well as reduce the damage of the switch of the telephone base due to frequent pickup.

- When the operator is busy, provide busy tone to the caller rather than ringing tone, it will reduce the caller's dissatisfaction.

- The number of call operators should be increased during first shift especially in peak hours.

- The operators should be given proper training for handling the calls effectively.

- The operators should be updated with all the new changes in the hospital especially in the areas of technology, processes, methods and procedures.

Limitations of the Study

- The time available for conducting this study was less.

- The technical problem in the internal telephone exchange or with the telephone system was not considered in this study.

- Thestudy on call operators qualification and skills which is a key factorfor deciding the call handling efficiency was not considered.

- The study on the present training system for the call operators at the Hospital was not included in the study.

RESULTS

Table 3: Before Six Sigma Application:

Holding Time	25200 Seconds (420 Minutes)
Number of Returned Calls	70 per day
Time taken by Returned Calls	1260 Seconds (21 Minutes)
Total Calls Attended per day	1400

Table 4: After Six Sigma Application

Holding Time	11200 Seconds (186.6 Minutes)
Number of Returned Calls	Zero
Time taken by Returned Calls	Zero
Total Calls Attended per day	1705
Improvement Percentage	21.8

Achieving Sustainable Development through Six Sigma

Six Sigma study were conducted in various fields with different perspectives such as reducing waste in coating process (Banuelas, Antony, & Brace, 2005), a goal-theoretic perspective (Linderman, Schroeder, Zaheer, & Choo, 2003), project management perspective (Lynch & T.Cloutier, 2003).

The Sustainability is defined as "Development that meets the needs of the present generation, without compromising the ability of future generations to meet their own needs" (WCED, 1987). Many studies were conducted in the area of six sigma and sustainability such as manufacturing sustainability (Thomas, Rowlands, Byard, & Rowland-Jones, 2008), lean and sustainability (Garza-Reyes, 2015), reducing environmental impact (Maher & K., 2013), performance of pollution prevention program (Calia, Guerrin, & Castro, 2009), energy management planning (Lee, Yuvamitra, Guiberteau, & Kozman, 2014), embedding LSS and Sustainability (Erdil, Aktas, & Arani, 2018)etc. Similarly there were many studies conducted in the field of integration of Six Sigma, Lean and sustainability which resulted in the development of various integrated models and few of them are conceptual model to integrate Lean, Six Sigma and Green Concepts (Garza-Reyes, 2015), an integrated model to reduce the waste related to construction processes (Banawi & Bilec, 2014), and also studied the critical success factors for the successful implementation of an integrated model (Kumar, Kumar, & Haleem, 2015)etc. Hence we can conclude that Six Sigma will make the path easy to achieve sustainability and sustainable development in a better way.

CONCLUSIONS

A quality technique, Six Sigma, was implemented at the hospital level for improving the effectiveness of call operation process by reducing the number of returned calls and the holding time at the Attendant Console. The Attended Console receives many calls daily for the service. All calls are handled centrally by the call operator/s at Attendant Console and connect to concerned individuals or Departments in the hospital. A number of customers had complained about long waits when they were calling for the service at the hospital. This study deals with hospital'sinability to answer customer calls effectively. The study finally helped to reduce the total holding time by 14000 seconds and also the time saved due to zero returned calls by 1260 seconds which resulted in overall improvement of call operation process by 21.8%.

REFERENCES

1. Amcom Software Inc. (n.d.). Retrieved from www.amcomsoft.com

2. Amtelco. (n.d.). ACD. Retrieved from 1Call: A Division of amtelco: http://1call.com/acd.php

3. Amtelco. (n.d.). IVR. Retrieved from 1Call: A Division of amtelco: http://1call.com/callCenterSwitchboard.php

4. Banawi, A., & Bilec, M. M. (2014). A framework to improve construction processes: Integrating Lean, Green and Six Sigma. International Journal of Construction Management, 01-14.

5. Banuelas, R., Antony, J., & Brace, M. (2005). An Application of Six Sigma to Reduce Waste. Quality and Reliability Engineering International, 21, 553 - 570.

6. Calia, R. C., Guerrin, F. M., & Castro, M. d. (2009). The impact of Six Sigma in the performance of a Pollution Prevention program. Journal of Cleaner Production, 17, 1303-1310.

7. DeHaan, P. (n.d.). Retrieved from AnswerStat, the Medical Call Center Magazine: http://www.answerstat.com

8. Erdil, N. O., Aktas, C. B., & Arani, O. M. (2018). Embedding sustainability in lean six sigma. Journal of Cleaner Production.

9. Garza-Reyes, J. A. (2015). Green Lean and The Need for Six Sigma. International Journal of Lean Six Sigma, 6, 226-248.

10. Kumar, S., Kumar, N., & Haleem, A. (2015). Conceptualisation of Sustainable Green Lean Six Sigma: an empirical analysis. International Journal of Business Excellence, 08, 210-250.

11. Lee, J., Yuvamitra, K., Guiberteau, K., & Kozman, T. A. (2014). Six-Sigma Approach to Energy Management Planning. Strategic Planning for Energy and the Environment, 33, 23-40.

12. Linderman, K., Schroeder, R. G., Zaheer, S., & Choo, A. S. (2003). Six Sigma: a goal-theoretic perspective. Journal of Operations Management, 193-203.

13. Lynch, D. P., & T.Cloutier, E. (2003, Feb). 5 Steps for Success. Six Sigma Forum Magazine, 2, 27-33.

14. Maher, A.-S., & K., E. A. (2013). Application of Six Sigma Methodology to Reduce Environmental and Economic Impacts of Discharging the Produced Water in Southern Iraqi Oil Fields. Journal of Management & Engineering Integration, 31.

15. Montgomery, D. (n.d.). Introduction to Statistical Quality Control (5th ed.). John Wiley & Sons.

16. Norman, K. (n.d.). Call centre work– characteristics, physical, and psychosocial exposure,and health related outcomes. Retrieved from DiVA: http://www.diva-portal.org

17. Thomas, A., Rowlands, H., Byard, P., & Rowland-Jones, R. (2008). Lean Six Sigma: an integrated strategy for manufacturing sustainability. International Journal of Six Sigma and Competitive Advantage, 4, 333–354.

18. WCED, W. C. (1987). Our common future. Oxford University Press.

19. Wikipedia. (n.d.). Computer Telephony Integration. Retrieved from

    https://en.wikipedia.org/wiki/Computer_telephony_integration