Call Center Management Systems

(Conference ID: CFP/358/2017)

Author: Kangwa Chikwanda

therajahh@yahoo.co.uk

Information and Communications University,

School of Engineering,

, Lusaka, Zambia

Abstract:

Call Center Management System is an increasingly important skill as the use of call centers becomes a popular method of centralizing information services, streamlining order taking and providing valuable customer support. The skills required to successfully set -up and manage a call center encompasses everything from staff recruitment and personnel management, to technical understanding of the options available, and the al-important customer relationship management. From small customer service departments to large call centers, the importance of developing successful call center management is vital for building a valued relationship with the customers to support long- term business growth.

This system (Call Center Management System) is useful to the organization, it maintains the information about the employees and it also contains the necessary information of the customer and their phone Numbers, their services also. It also maintains the employee roaster details.

This system will track the employee's login details. And also maintains the data the employee attends the call and his behavior with customer and the speech will be recorded into file. Sometimes customer request for service to the organization. This data also maintains the system.

Keywords   *Administrator, Availability, Confidentiality, Computer, Cyber, Debug, Employee, Implementation, Password, Privacy, Security, Testing, Username.*

1. Introduction

A call center is a centralized office used for the purpose of receiving and transmitting large volume of requests by telephone. A call center is operated by an organization to administer incoming product support or information inquiries from consumers. Outgoing calls for telemarketing, clientele, product services, and debt collections are also made. In addition to the call center, collective handling of social media feeds, live chats, and e-mails at one location to be known as a contact center.

In a typical call center, the arriving calls are classified in different types, according to the required technical skill to answer the call, the language, importance of the call, etc. Call Centers Agents are also classified in skill groups according to the subset of call types they can handle. Calls arrive at random according to some stochastic process. When a call arrives, it may be assigned immediately to a Call Center agent that can handle it (if there is one available) or it may be put in a queue (usually one queue per call type). When a Call Center agent becomes available, the agent may be assigned a call from one of the queues, or may remain idle (e.g., waiting for more important calls). All these assignments are made according to some routing policy that often incorporates priority rules for the calls and Call Center agents. Calls waiting in a queue maybe abandon after a random patience time. Those subscribers who abandon waiting may call again later, although those retrials are rarely modelled in practice, usually because of lack of sufficient data. Callers who received service may also call again for a number of reasons; these are called returns. In the (degenerate) special case where each Call Center agent has a single skill, we have several single queues in parallel. If each Call Center agent has all skills, then we have a single skill set and a single queue. The system is obviously easier to analyses in these extreme cases. With all Call Center agents having all skills, the system is also more efficient (smaller waiting times, fewer abandonment). Call Center Agents with more skills are also more expensive; their salaries depend on their skill sets. Thus, for large volume of call types, it makes sense to select a number of single-skill Call Center agents (specialists) to handle most of the load. A small number of agents with two or more skills can cover the fluctuations in the proportion of calls of each type in the arriving load.
A call center is often operated through an extensive open work space for call center employee, with workstations that include a computer for each call center agent; telephone set / handset is connected to a telecommunication switch, and one or more supervisor stations.

2. Background

Call Centers and Call Center Management Systems emerged and developed over the past few years in order to satisfy the need for a single point of customer contact that enables the organization to focus on individual customers' needs and services that they want and there are currently using, but still be efficient and cost effective. The scope and role of Call Center Management Systems continues to grow and over the past few years this has largely been made possible by the rapid advancements in the Information and Communication Technologies. As companies learned that service delivery and excellent delivery is cardinal to attracting, retention and maintaining customers, the perception of the call center and call center management systems has changed.

Managing customer access and relationship is a key driver of bottom –line profits. Today's customers put great value and emphasis on timely access to information and services provided to them. In fact, the vision of the customer "access center" of the future is to make information and services accessible to customers at any time, from anywhere, in any form, and for free. This ease of customers to have access to products and services is fast emerging as a critical factor of a global business, customers will deal preferentially with those companies deemed most accessible. The role of the Call Center Management Systems can be depicted as shown in Fig 2.1
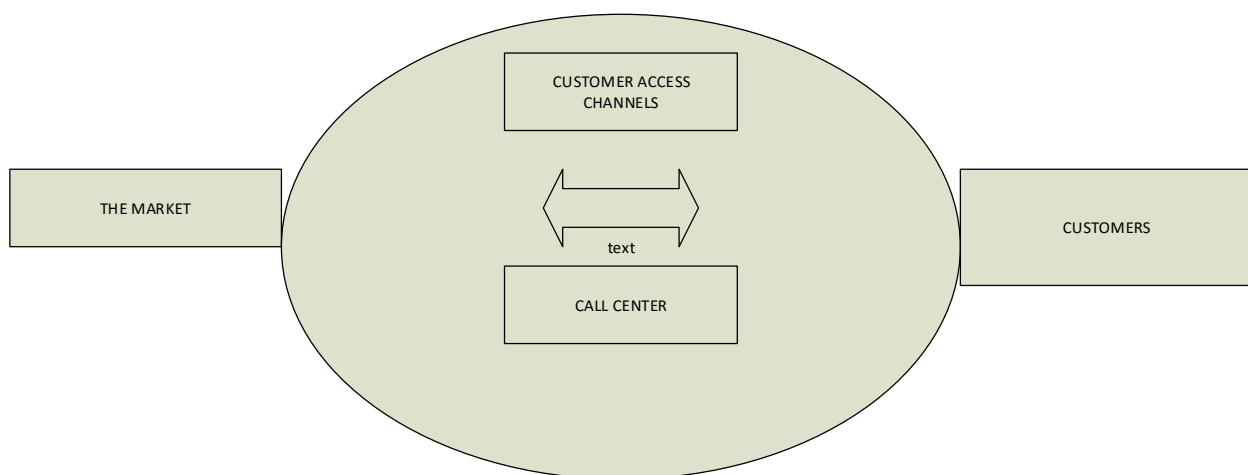

Fig 2.1

The basic business environment consists of a market, customers, and the channels that customers use to access the market or conversely the market uses to access customers. The call center management system is used by organization as a mechanism in the customer access area, serving as a link or a channel between customers and the market and also between the market and the customers. We must bear in mind that as this environment changes, so too does the role and functionalities of the call center management system.

Customers are becoming more complex and sophisticated in terms of their desires and needs and more demanding interms of the level of quality of products and services that they desire. At the same time the market keeps changing to cater for these needs or whenever new products and services are created by influencing the market. It is also becoming a more global and deregulated market, which as stated before, has led to customers expecting or demanding a standard or higher level of services and quality. These changes have had the effect that the access channels between the market and customers have had to expand interms of variety and technology. It is for this reason that the call center and call center management systems have become the primary interfaces for various companies and with their customers and end-users.

Today's call centers and call center management systems is a strategic imperative, one which allows companies to provide superior services and products, to allow customers and end-users to communicate through any channel and reduce the cost of doing business.

3. Methodology

In my work here, the research work was aimed at carrying out a detailed study of the present call center management system by identifying, analyzing and providing a solution to the challenges that are currently affecting call center management system at Zambia Telecommunication Company Limited (Zamtel). The main sources of information were done with Telco's which have call center management systems like MTN- Zambia which has the call center managed by ISO BPO, Airtel- Zambia which has it call center managed by Tech mahindra and further comparison was done with the call center at the ministry of labour and also a power utility company Zambia Electricity Supply Corporation (Zesco) which also has a call center management system.

The other sources of data comprised of published textbooks, call centers journals, policy documents on call centers and call center management systems, academic journals, articles and

reports on call centers. The challenges were identified from the data collected from the detailed study carried out on the present call center management system from different Telco's, the ministry of Labour and the energy utility company and the challenges that were identified were as follows;

- ➢ Lack of multi- skill call center agents to handle call center management systems.
- ➢ The existing system is a manual system, here the employee's need to save their work and information on the Microsoft excel sheets or external pens and disk drives.
- ➢ The manual system gives us very less security for saving data; some data maybe lost due to mismanagement.
- ➢ It is a limited system and it is not user friendly.
- ➢ Searching for particular information which is critical takes a lot of time.
- ➢ It is very critical to maintain call records in the call center, but it becomes difficult to maintain call records when you using a manual system. Because a call center receives huge number of calls per day.
- ➢ It is a tedious job to maintain different customer service, who are asking for different services details, normally to solve this type of queries is not possible. That is why an automated system is need.
- ➢ Every employee having different roasters, different shifts timings, manually to handle these roaster is tough work.
- ➢ Searching for an employee roaster in call center system is a tedious job.

Solution to these challenges

1. Need for a multi –skills centered call center management systems call center agents.

Calls from different skill classes are offered to the call center according to a Poisson process with a rate λ. The call center agents in the call center are grouped according to their heterogeneous skill sets that determine the classes of calls that they can serve. Each call center agent group serves calls with independent and equally exponentially distributed service times equal to one (for simplicity). We consider a call center with no buffers in the system, so that every arriving call either has to be routed immediately or has to be blocked and is lost. The objective in the system is to calculate the call lost probability.

Example 1. Markov process for the simplest two-skill call center
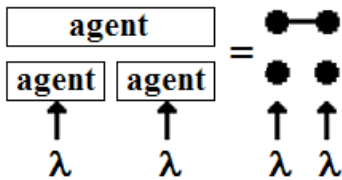

Figure 1. Two skill call center management system with 3 call center agents.

Fig 1 displays the simplest two-skill center model: 2 skills and 3 agents, two of them are individualists (single skill) available for calls as the first choice and one generalist (2-skill agent) available for calls as the second choice. To calculate the call lost probability we build Markov process having 8 states as shown in the state diagram (Fig 2). (Busy agents are given in black.)
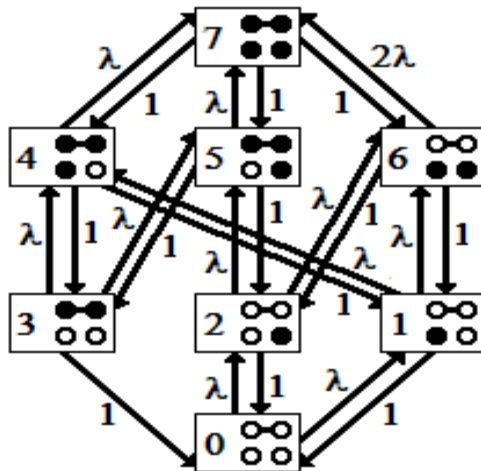

Figure 2.   State diagram and Markov process intensities

Markov process stationary state probabilities pi, i = 0… , 7 are defined by the equations:

$2\lambda\, p0 = p1 + p2 + p3$

$(2\lambda+1)p1 = \lambda p0 + p4 + p6$

$(2\lambda+1)p2 = \lambda p0 + p5 + p6$

$(2\lambda+1)p3=p4+p5$

$(\lambda+2)p4=\lambda p3+\lambda p1+p7$

$(\lambda+2)p5=\lambda p3+\lambda p2+p7$

$(2\lambda+2)p6=\lambda p1+\lambda p2+p7$

$3p7=\lambda p4+\lambda p5+2\lambda p6$

$p0+p1+\ldots+p7=1$

By solving the system, we get the call loss probability π (pictured in Fig 3):
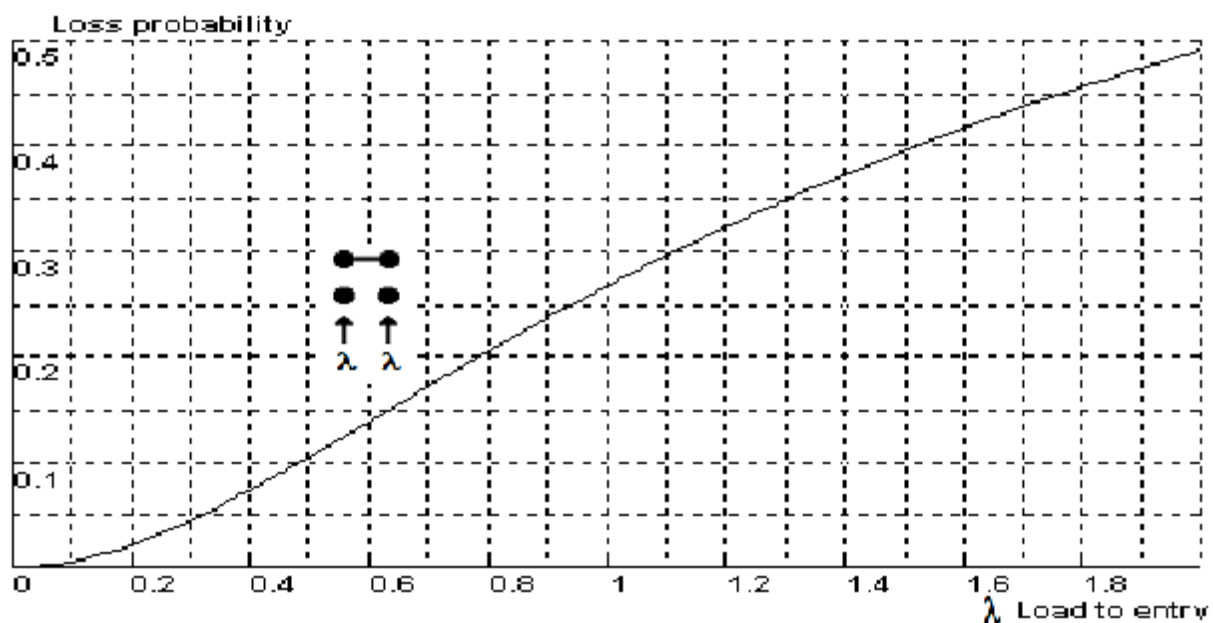

Figure 3. Two-skill call center loss probability

Traditionally, there are two types of call center agents in a call center: individualists (handling calls of one type of services and products) and generalists (handling calls of any type service and products). Figure 4a corresponds to the traditional scheme: there are 4 call center agents who handle calls of one type (from different 4 skills) and 2 call center agents who are generalists. Every call flow has access to 3 agents, and the calls are looking for idle call center agent from below (as arrays show). We show that it is advantageous to reject the traditional scheme and

switch to a scheme with the same number of different skills for any call center agent (as is shown in Fig. 4b). Figure 5 depicts the loss probability curves for these two schemes. And what is surprising? Beginning with a loss probability as low as 0.25 (less than 1%), it is advantageous to use the equally distributed scheme where any agent is received by two type calls. The advantage occurs at as low total call rate as 0.73 (i.e. there is less than one call in the whole system) and the agents are busy only 0.73/6 = 12% of the time. Therefore, the traditional grading-type call centers could be recommended when call rates are very low.
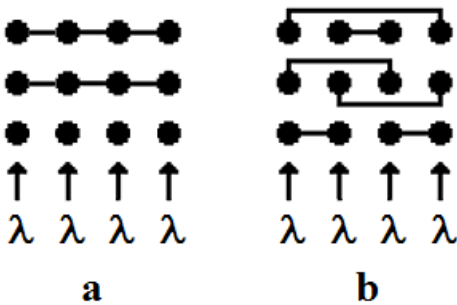

Figure 4. Two multi-skill call center schemes: a) grading-type, b) with equally distributed skills
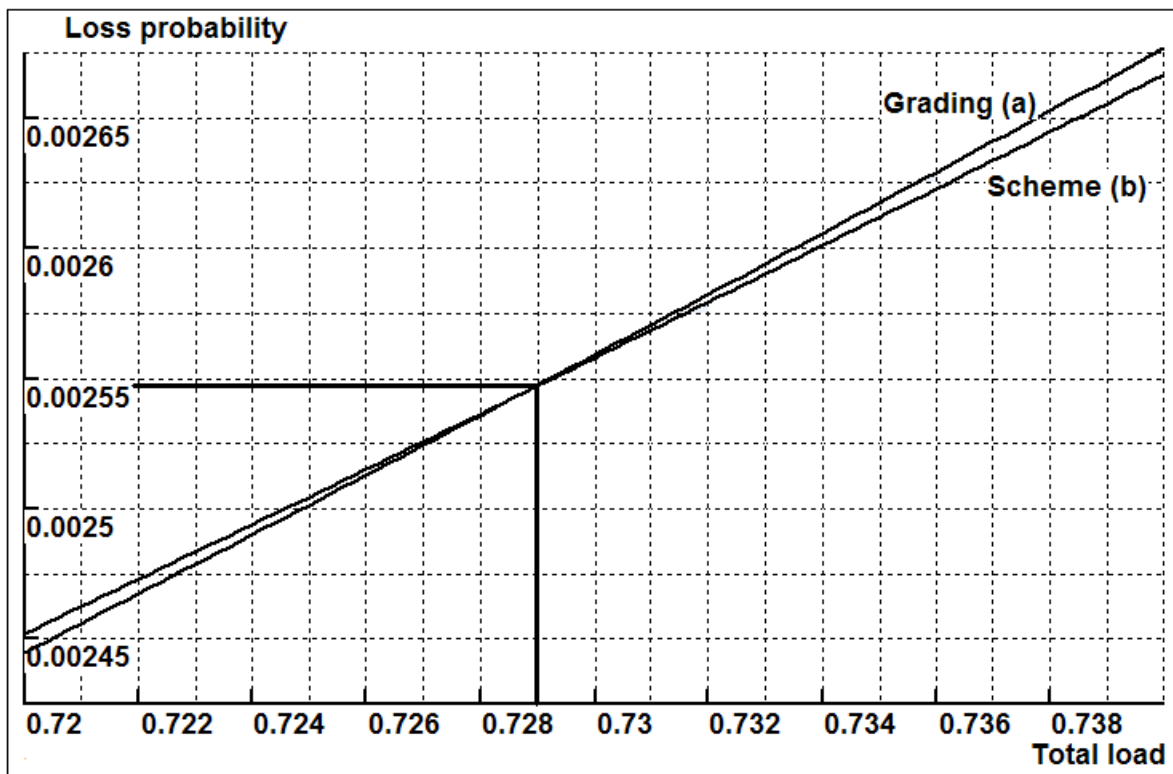

Figure 5. Comparison of call center routing policy: grading (a) is prefer-able for low rates only, but as load grows the scheme (b) becomes preferable

2. The development of this new call center management system contains the following activities, which will try to automate the entire process of call center management system keeping in mind the view of database integration approach.

> ➢ User friendliness is provided in the application with various controls provided by the system's rich user interface.
> ➢ The systems make the overall project management much easier and flexible.
> ➢ This news call center management system is a web based application which can be assessed over a corporate intranet.
> ➢ The user information can be stored in a centralized database which can be maintained by the system.
> ➢ This can give good security for the user information because data is not stored on a client machine.
> ➢ Authentication is provided for this application only registered users can have access.
> ➢ There is no risk of data mismanagement at any level while the project is underway.
> ➢ The automated system will provide to customer reliable services.
> ➢ The speed and accuracy of this system will improve much more.

4. Results and Discussion

4.1. Discussion

The methodology included carrying out a detailed study of the present Call Center and Call Center Management Systems, implementation schedule and identification of the challenges.

> ➢ What are the types of challenges that can affect the successful design and implementation of a robust and responsive Call Center Management System to meet the customer's satisfaction but also effective and in a cost-effective manner.
> ➢ What are the required skills –set of the Call Center Agents, and the technical know-how of the agents on the products and services so that the new Call Center Management systems their expectations and the system becomes friendly in terms of ease of use.

4.2. Results

 We design the result by using Microsoft.Net framework. The .Net framework is a software technology that is available with several Microsoft windows operating systems. It includes a large library of pre-coded solution to common programming problems and a virtual machine that manages executions of programs written specifically for the framework. The .Net framework is a key Microsoft is offering and is intended to be used by newest applications created for windows platform but also support C#, visual basic, and Java script. We also use ASP.Net which is a programming framework built on the common language runtime that can be used on a server to build powerful web applications. And SQL Server a databases management, or DBMS, gives the user access to their data and helps them transform data for information.

Parameters	Value
Framework	Microsoft.Net Framework
Operating system	Windows 8,8.1 and 10
Database	SQL Server 2005/8/10/12
Design	Call Center Management System

Fig 4 Design Parameters

1. **Home Portal**
   Here is where the administrator and the call center agents are directed first once they login into the Call Center Management System.
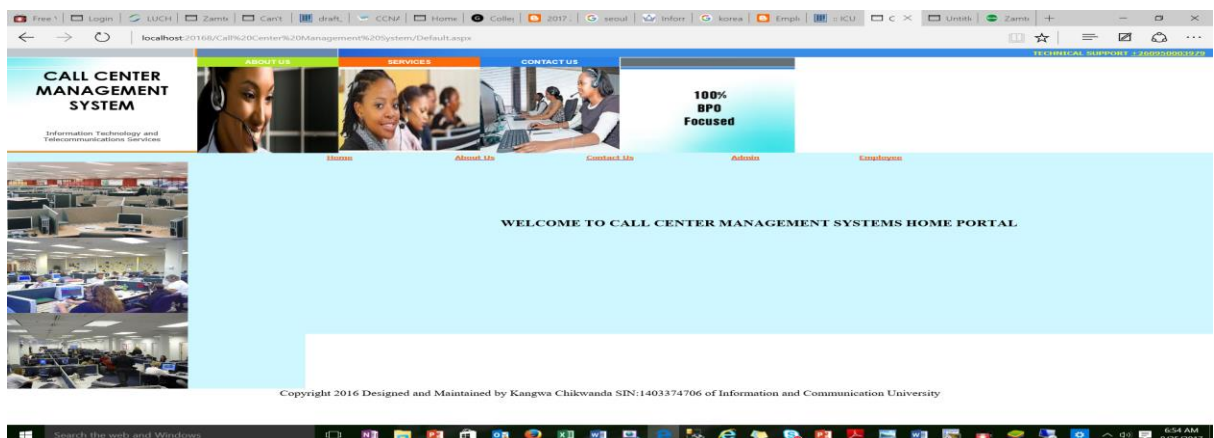

Fig 4.1 Home Portal

2. **Admin Portal**

Administrator is the chief of the Call Center Management System. He can have all the privileges to anything in this system, Administrator can register new call center agents, and departments into the system. Administrator can keep track of call center agent's activities and their performance. For every call received the Administrator is taking feedback report. New services and products are introduced by the Administrator into the Call Center Management System. Call activity done by the administrator, for every call the Administrator captures the information of the call ID, date, time attended agent ID, his roaster ID, customer information and recording voice.
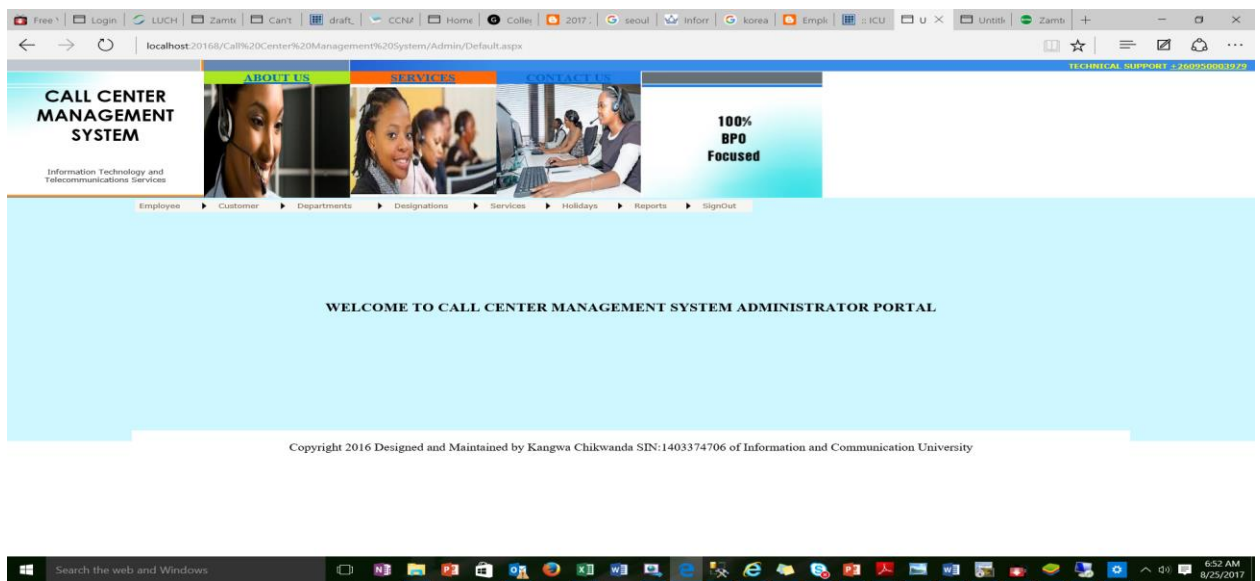

Fig 4.2 Admin Portal

3. **Call Center Agent**

Here the term employee means they are maintaining the call center, the major responsibility for the call the call center agent's is they have to receive the calls and emails from the customers and process the customer's queries. The main issue is it here the call center agent can give necessary answer to customer queries because different customers are posting various services queries.
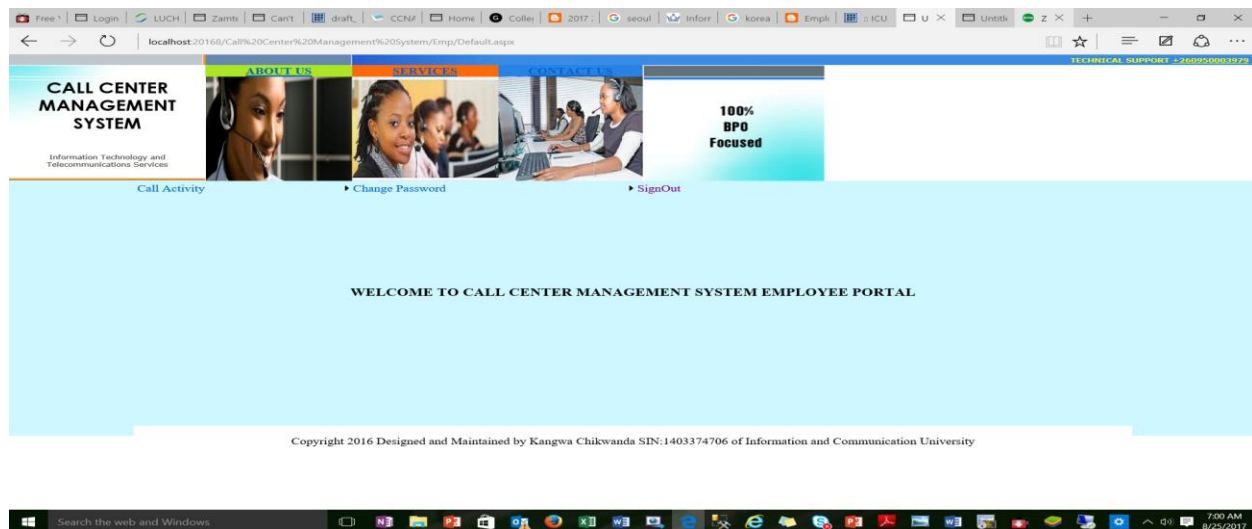
Fig 4.3 Call Center Agent Portal

4.2.1.   Results and Proposed System to be Designed

Item	Identified Challenges	Proposed System
1	The existing system is a manual system. Here the employees need to save their work and information on the excel sheets or external pens and disk drives.	User friendliness is provided in the application with various controls provided by system rich user interface.
2	The existing systems have no file share which make the sharing of data impossible, if data is in form of paper and is on disk drives.	The system makes the overall project management much easier and flexible.
3	The manual system gives us very less security for saving data; some data may be lost due to mismanagement.	This new call center management system call can be assessed over a corporate intranet.
4	It is a limited system and it is not user friendly.	The user information can be stored in a centralized database which can be maintained by the system.

5	Searching for particular information which is very critical takes a lot of time.	This can give good security for user information because data is not on the client machine.
6	It is very critical to maintain call records in the call center, but it become difficult to maintain call records when you are using a manual system. Because a call center receives huge number of calls per day.	Authentication is provided for this application only registered users can have access.
7	It is a tedious job to maintain different customer services who are asking for different services details, normally to solve this type of queries is not possible. That is why an automated system is needed.	There is no risk of data management at any level while the project development is under way.
8	Every employee having different roasters, different shift timings, manually to handle these roaster is tough work.	The automated system will provide to the customers' reliable services.
9	Searching for an employee roaster in call center system is a tedious job	The speed and accuracy of this system will improve more and more.

5. Conclusion

In this research the aim was achieved as the challenges that had a hindrance to a robust and responsive Call Center Management System in the Call Center where a detailed research and study was conducted were identified and the action plan to resolve the challenges put in place. A proposal of developing and designing a new Call Center Management System which will be robust and responsive to customer's needs and services.

In this study mitigation plans were more specific and involved more concrete action because of the importance of the Call Center Management System are today's business. And the benefits of the newly designed Call Center Management Systems will be as follows;

- ➤ It's a web-enabled project.
- ➤ This project offers user to enter the data through simple and interactive forms. This is very helpful for the client to enter the desired information through so much simplicity.
- ➤ The user is mainly more concerned about the validity of the data, whatever he is entering. There are checks on every stage of any new creation, data entry or updating so that the user cannot enter the invalid data, which can create problems at later date.
- ➤ Sometimes the user finds in the later stages of using project that he needs to update some of the information that he entered earlier. There are options for him by which he can update the records. Moreover, there is restriction for his that he cannot change the primary data field. This keeps the validity of the data to longer extent.
- ➤ User is provided the option of monitoring the records he entered earlier. He can see the desired records with the variety of options provided by him.
- ➤ From every part of the project the user is provided with the links through framing so that he can go from one option of the project to other as per the requirement. This is bound to be simple and very friendly as per the user is concerned. That is, we can say that the project is user friendly which is one of the primary concerns of any good project.
- ➤ Data storage and retrieval will become faster and easier to maintain because data is stored in a systematic manner and in a single database.
- ➤ Decision making process would be greatly enhanced because of faster processing of information since data collection from information available on computer takes much less time than manual system.
- ➤ Allocating of sample results becomes much faster because at a time the user can see the records of last years.
- ➤ Easier and faster data transfer through latest technology associated with the computer and communication.
- ➤ Through these features it will increase the efficiency, accuracy and transparency.

6. Acknowledgments

7. References

[1] Bhulai S. and Koole G. A queueing model for call blending in call centers. IEEE Transactions on Automatic Control, 2003, 48: 1434–1438.

[2] Gurvich I., Armony M., and Mandelbaum A. Service level differentiation in call centers with fully _exible servers. Management Science, 2008, 54: 279–294.

[3] Koole G. and Mandelbaum A. Queueing models of call centers: an introduction. Annals of Operations Research, 2002, 113: 41–59.

[4] Gans N., Koole G., and Mandelbaum A. Telephone call centers: tutorial, review, and research prospects. Manufacturing and Service Operations Management, 5: 79–141, 2003.

[5] Bhulai S. Dynamic routing policies for multi-skill call centers. Prob in Eng and Inf Sc 23 (1), 75–99, 2009.

[6] Koole G. and Talim J. Exponential approximation of multi-skill call centers architecture. In Proceedings of QNETs 2000, pages 23/1–10, 2000.

[7] Benes V.E. Markov processes representing traffic in connecting networks. Bell System Techn. J., 1963, 42, 6,

61 International Journal of Networks and Communications 2012, 2(4): 55-61

2795–2838.

[8] Schneps-Schneppe M., and Sedols J. Multi-Skill Call Center as a Grading from "Old" telephony. In S. Balandin et al. (Eds) Smart Spaces and Next Generation Wired/Wireless net-working. LNCS 5764, pp. 154-167, 2009.

[9] Benes V.E. Some examples of comparisons of connecting networks. Bell System Techn. J., 45, 10, 1966, 1829–1935.

[10] Askin, O.Z. Armony, M. & Mehrotra, V. The Modern Call- Center. A Multi-Disciplinary Perspective on Operations Management Research. Production and Operations, forthcoming, 2007.

[11] Anton, J. Bapat, V. & Hall, B. Call Center Performance Enhancement using Simulation and Modelling. Ichor Business Books, Purdue University Press, USA.

[12] Arivia. Kom (2006). Virtual Contact Center Solution. Accessed 6th April, 2017 from World Wide Web: http://www.arivia.co.za/main/ser_sol/316565%20VCC.pdf

[13] Bailer, C. (2006). Contact Centers, Model Maturity. CRM Magazine, Vol. 10, Issue 8, pp. 13-13.

[14] Barnet, G. (2006) The Contact Centre Industry, Where we've have been and we're going next. Customer inter@action Solutions. Accessed March 10, 2017 from the World Wide Web: http://www.allbusiness.com/markertingadvertising/3583203-1.html

[15] Bocklund, L. & Bengston, D. (2002). Call Centre Technology Demystified. Call Centre Press ICMI, Maryland.

[16] Dawson, K. (2004). The Call Centre Handbook. CMP Books, San Francisco, USA.

[17] Brown, L. Grans, N. Mandelbaum, A. Sakov, A. Zetlyn, S. Zhao, L. & Haipeng, S. (2005)., and Statistical Analysis of a Telephone Call Centre, A Queuing Science Perspective. Journal of the American Statistical Association, Vol. 100, No.469, pp. 36-50.

[18] Bhulai, S. Koole, G. & Pot, A. (2007). Simple Methods for shift scheduling in Multi – Skill Call Centres. To appear in Manufacturing and Service Operation Management. Accessed 15 April, 2017 from the World Wide Web: http://www.math.vu.nl/obp/callcentres/

[19] Gans, N. Koole, G. & Mandelbaum, A. (2003) Telephone Call Centre, Tutorial, Review, and Research Prospects. Manufacturing & Service Operations Management, Vol.5, No. 2.

[20] Garnet, O. Mandelbaum, A. & Reiman, M. (2002). Designing a Call Centre with Impatient Customers. Manufacturing & Service Operation Management. Vol.4, No.3, pp. 208-227.

FEEDBACK

The feedback that I got from the panel during and after the paper presentation of the paper Call Center Management System was excellent and very encouraging. The panel liked the paper I presented and the solution it is about to offer, and they also like the manner in which I did my presentation at the conference.