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Analysis of Queuing to Customers Management in Banking: A Case Study

Hansani WADI, Arachchige KGB, Rasanjana KAN, Sonali ALDD, Samarawickrama IDW
Department of Industrial Management, Wayamba University of Sri Lanka
isankahansani401@gmail.com

ABSTRACT

Banking services have emerged as a foremost service under contemporary circumstances. The vigorous competition among the banking and financial services sector provides a platform for continuous improvements in their services. With the increased usage of banking services, identifying the means of improving customer satisfaction is essential. Psychology of waiting lines has proven to decrease the level of satisfaction through the increased waiting times. The study was undertaken to model and reduce the waiting times at the two counters of a commercial bank. Primary data on arrival and the service times for each customer arrival at the counters were taken. The study was conducted during the working hours for two consecutive weeks. Data collected from 150 customers were modelled using the student version of Rockwell ARENA 14.5 platform. The system was then modelled as multiserver quieuing system with unlimited waiting room capacity.It was run for 100 a replication length of customers. It was observed respective waitng times in the queues of current system to be 11 and 1.52 minutes for counter 1 and counter 2 respectively. Further the corresponding number of customers waiting in the queues were five and one. Therefore, the bank needed improvements for efficient service delivery. The system was simulated on two basic alternatives, namely; increment fo the service rate in a single queue at a time and the increment of the service rate in both the queues at once. The results obtained depicted the waiting times of the queues to be 5.25, 0.16 minutes and 0.52 ,0.12 minutes, respectively for the two alternatives. Thus the bank can eliminate excessive waiting through the increment of the service rate by two-fold in one queue or in both the queues at once. The obtained results moreover emphasized the importance of the employees in the service industry and their continuous improvements in both skills and knowledge.

KEYWORDS: ARENA Simulation, Bank Queues, Customer Management, Waiting Times

1 INTRODUCTION

Sri Lanka has shifted to a service prominent economy from its agriculture-based economy. The development of technology and the shift toward an information-based era, sets service based industries in a prominent place. Among the foremost industries in the country is the Banking and Financial sector (Central Bank of Sri Lanka, 2018). There is a well-diversified profile in the banking sector with government, commercial and foreign banks serving the customers under the supervision of the Central Bank of Sri Lanka.

The increased uasage of the banking services with the unmoved resource management incur waiting times for the customers. The psychological nature of the waiting times has the highest impact on satisfactory levels of a customer.

The study attempts to analyze customer waiting at queues of a commercial bank of Sri Lanka. Thus the objective was to identify the measures of minimizing the waiting times through modelling and simulating changes to the existing arrangement.

The existing practice of the bank includes two serving counters. The counters were not significantly seperated for different activities. Thus the system was defined from the arrival of each customer to a queue of their choice until the customer has been

served. The queues at the system were served on First-In-First-Out (FIFO) discipline.

Rockwell ARENA was used in modelling and the alternatives testings in the study.

2 LITERATURE REVIEW

Rockwell ARENA is a software that uses SIMAN langugae in simulating the real life situations. The software allows the modelling and alterations of the existing arrangement through predefined models. (http://www.arenasimulation.com, 2009)

Rai et al. (2014) traced the best methods of learning and teaching practices of the computational modelling and simulation used by the higher educational institutes. The authors studied 100 teaching experts to identify the importance of the modelling and simulation in the modern world practices.

The studies conducted in computational modelling has not been limited to the manufacturing related industries. The service oriented industries also uses the computational simulations in obtaining the optimization in their processes.

Madadi et al. (2013) conducted a simulation study on a bank in Malaysia. The authors suggested configurational improvements in average utilization of the counters in reducing the average waiting times of customers in queues using a compuational simulation.

Manaye & Worku (2018) conducted a simulation study on an ATM of a commercial bank of Ethiopia, Sabyan branch. They concluded that increment in processing speed of the system and increasing the number of service counters from two to three are the best alternatives in reducing the waiting times.

3 METHODOLOGY

The study was conducted for a commercial bank in Sri Lanka and the total number of customers of the bank was the

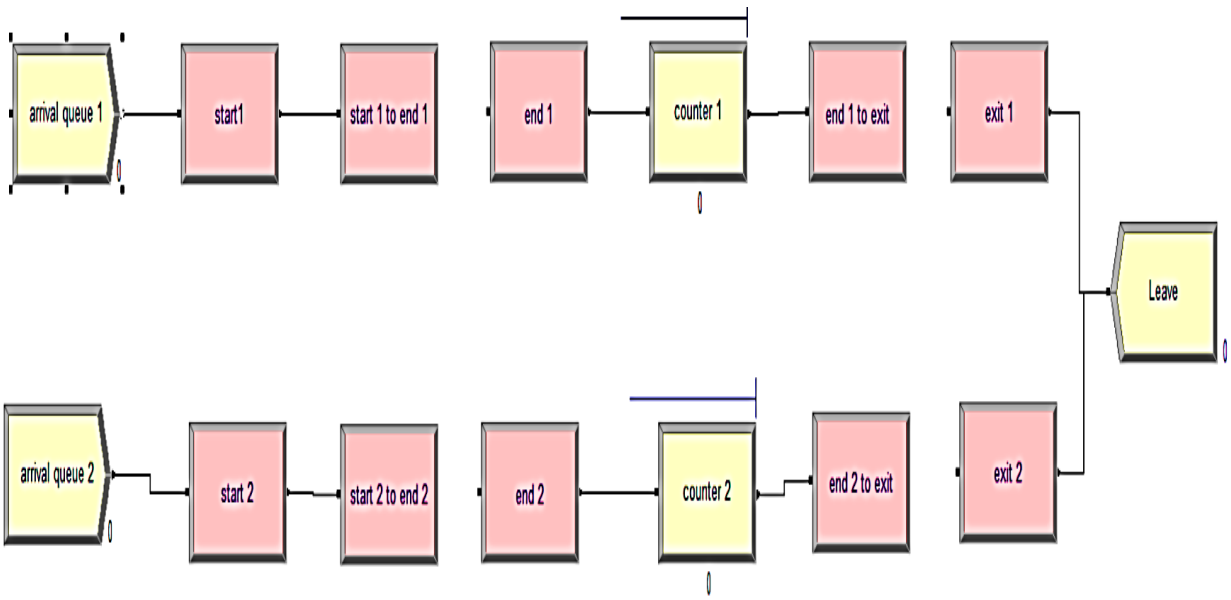

Figure 1:Model of the Existing Process

Table 1: Input Analyzer Distributions

Process	Distribution	Expression
Customer Arrivals : Queue 1	Gamma	-0.001+ GAMM (159,0.891)
Customer Arrivals: Queue 2	Exponential	-0.001+ EXPO (123)
Service Time: Queue 1	Weibber	39+WEIB (121,1.16)
Service Time: Queue 2	Normal	NORM (119,68.7)

population of the study. The time contraints of the study limited the observations of the system to consecutive weeks. It was done during the bank working hours. The bank branch selected operated two service counters.

3.1 Data Collection

Data on times of arrivals and the served times were taken through 150 observations. The arrival times of the customers to the queue, service strting time and the ending time were recorded in order to obtain the inter arrivals. Times of the observed data were recorded in seconds.

3.2 Assumptions of The Study

- When been served, FIFO basis is used.
- All servers are present at all times to serve the customers
- The customers to the system is unlimited
- The system has an unlimited waiting room for the cutomers to join the queue

3.3 System Modelling

The observed data were used in the calculation of the inter-arrival times and the service rate of the servers. The difference between two consecutive arrivals was taken as the inter-arrival time. The inter-arrivals obtained from the calculations were fed in to the Input Analyzer to obtain the probability expressions of the processes shown in Table 1.

The process was modelled on ARENA for two queues. The model depicted in Figure 1, has separate arrivals for the two queues.

The ARENA simulation was modelled in seconds and waiting times were obtained. (M1) The model was then changed to obtain different changes in the increment of service. Changes in the model followed increments in the service rates. Increased service rate by two-fold for queue one only (M2), for queue two (M3) only and for both queue one and queue two (M4) were the modelled developments. Addition of another service counter was not taken into consideration because of the spatial concerns of the bank.

4 RESULTS AND DISCUSSIONS

The models developed had 63.15, 61.90, 60 and 69.23 percent serving rates for the models M1, M2, M3 and M4 (Table 2). The average service rates of the existing and the proposed methods were all above 60 percent in the serving rates.

Waiting times of the exiting model was nearly 2.00 and 4.00 minutes for queue one and queue two respectively. The aim was to reduce the obtained waiting times.

M2 of the proposed models allowed a reduction in the waitig times of queue one letting queue two to increase the waiting times drastically. M3 of the models reduced the waiting times of both the queues compared to M1. M4 model also reduced the waiting times to zero in both queues through the increment in the service rates of the servers by two-fold.

All the improved models reduced waiting times of the exisiting processes on different circumstances. Thus M3 and M4 were

considered as the best possible solutions for the waiting time delays occuring in providing service for the customers.

5 CONCLUSIONS AND RECOMMENDATIONS

This study simulated the existing customer handling process of the bank. It identified a waiting time of nearly 11 and 2 minutes for queue one and two respectively. To imrpove the service provided at the bank, three developments were proposed. There were to increase the service rate of the queues one at a time and to increase the service rate of both the queues at once. The proposed developments all had reduced waiting times ranging from 52.27 to 95.27 percent reductions in the queues seperately.

Due to the mismatch in M2 with respect to the results expected, M3 and M4 were the only models that improved the performance of the process. Thus, they are chosen as the most suitable improvements. For the performance improvements in the system bank staff that serves at the counters must be trained well with necessary skills and the knowledge to perform their tasks.

Limited available time for the study was a limitation that led to a restricted number of observations. The accuracy of the study can be developed through the increment of the data or the data collection on different weekdays.

The study can be further developed to identify the waiting times of the customers with respect to their needs. Thus improvement in the customer management at the banks in line with appropriate training for the staff can be maintained.

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Table 2: The Simulated Results of the Bank Queues

	Existing Model (M1)	Model Development (M2)	Model Development (M3)	Model Development (M4)
Number In	44	47	47	46
Number Out	34	38	39	40
% of serving	77.27	80.85	82.98	86.96
Average Waiting Time (Counter 1) (minutes)	11	0.52	5.25	0.52
Average Waiting Time (Counter 2) (minutes)	1.92	5.37	0.16	0.12

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