Journal of Management Research and Analysis 2022;9(4):201–206

Content available at: https://www.ipinnovative.com/open-access-journals

Journal of Management Research and Analysis

Journal homepage: https://www.jmra.in/

Original Research Article

Waiting line theory with robotic process automation (RPA) in shopping malls: A literature review

Sunita Kumar[1], R. K. Tailor[1,*]

[1] *Dept. of Business Administration, Manipal University Jaipur, Rajasthan, India*

ARTICLE INFO

Article history:
Received 16-10-2022
Accepted 13-11-2022
Available online 09-12-2022

Keywords:
Robotic Process Automation
Waiting Line
Shopping Malls

ABSTRACT

The present era is a technological era. Every business organization is affected by the information technology which provides good pace to their users. In the present modern world, waiting line has been identified as a biggest problem in the shopping malls in India. Hence, to raise this problem I have selected the present title for my research. The waiting line in the shopping malls are the biggest problems in present era. Majority of customers are depressed in their long queues. Hence, they may feel harassed by the shopping malls and try not to join again. It may be a major cause of dissatisfaction of their buying as well as their wastage of time. The waiting period reduces tremendously by using Robotic Process Automation.

1. Introduction

Robotic Process Automation (RPA) can be defined as accounting process which involves use of advanced computer programs including artificial intelligence and advance algorithms and has minimum human interference. Robotic Process Automation (RPA) is more like a tool of Accounting rather a substitute of human accounting and it complements the other rather replacing the other. Robotic Process Automation (RPA) can be of immense help in reconciliation and consolidation of huge data and reduces the possibilities of human errors. [1–9]

In modern age of internet and computer, Robotic Process Automation (RPA) is of immense help in automatization of the accounting work in big commercial concerns. Implementation of Robotic Process Automation (RPA) is cost effective since no significant capital investment is required and can be implemented with existing digital setup with minor modifications. It is very time saving due to technology intensive and it can easily perform complex data analysis in no time. [10–16] The entire process is with minimal human interference and thus, error free. The biggest advantage of the Robotic Process Automation (RPA) is that it can work 24x7x365 without any break or leave which is otherwise not possible with the human work force. In absence of Time Foundations and limitations of human body and mind, Robotic Process Automation (RPA) would tend to increase productivity by thousands of folds. The use of Robotic Accounting would lead to improved quality of accounting as it would have no chances of errors resulting in quality of work. Certain industries which involve hazardous chemicals or hazardous environment can make best use of Robotic Accounting by minimizing any harm or loss to human life.

2. Objectives

1. To examine the waiting line system in the shopping malls of Jaipur.
2. To study the literature of Robotic Process Automation.
3. To analyze the factors affecting Robotic Process Automation (RPA) in the waiting line system.

* *Corresponding author*.
E-mail address: drrktailor@gmail.com (R. K. Tailor).

https://doi.org/10.18231/j.jmra.2022.040

Table 1: Literature of (RPA)

Sr. No.	Author	Title	Objective	Methodology	Conclusion	Gap
1.	Muddasir, Ahmad and G. Jayalalitha (2019)[7]	Analysis of single and multi- server queuing models with balking and reneging	1.To study the queuing model in IT sector 2. To find the queueing system and queuing networks and also it analysis of queuing single and multi-server models.	1.Probability Distribution 2.Exponential Distribution 3.Poisson Distribution	This paper describes the queuing theory developed an attempt the fluctuating demands of the queue length and gives a general look at the queuing theory. It describes elementary queuing models and also application of queuing models. The service rate and arrival rate are investigated with the help of queuing theory with the customer's behaviour, Balking and Reneging.	Focuses only queuing servers. No proper method has been selected.
2.	Rao, Abhilash Nissankara, (2019)[12]	Queuing Time and Shopping Time of D-Mart Customers with Special Reference to Guntur City, Andhra Pradesh	1.To find how much queuing time is taking the customer from shopping to billing process. 2.To find at what time this Queuing time is high in the Retail store. 3.To find out exit timings of the customers and shopping times of the customers.	1.Field data collected in pilot study 2.Percentage analysis 3.Frequency analysis 4.Regression statistics	The study shows that most customers are prepared to join in long queues. Time consumption in queues has become normally acceptable. This also shows that absence of alternative solution, customers have accepted long queues as imminent.	This study is based on one city and only one mall has been selected.
3.	Ahuja, Anjali. et al. (2018)[1]	Finite Population Multi-Server Retrail Queuing system with an Optional Service and Balking	1.To Find the multi-server queue with an optional service by incorporating several realistic features such as balking, optional service and finite population. 2.To study the retrial queueing system with an optional service and finite population subject to balking.	1.Probability Distribution 2.Matrix Analytic approach	This study is based on the multi server queue method which is appropriate to evaluate the several multi queue problems. this study is also focusing on the major problems which are associated with balking in designing a queue.	This study is based on multi-server queue, balking, optional service and finite population.
4.	Osaremwinda, Ogbeide and Oghenemega, Ejechi (2018)[9]	ATM Service Optimization of Banks: Queuing Modelling Approach	1.Determine customers average arrival rate and service rate of the ATM 2.Ascertain the average number of customers in the queue and in the ATM. 3.Ascertain the average time a customers spend in the queue and in the ATM	1.Observation 2.Personal Interview 3.Questionnaire 4.Random sampling	The study therefore recommends that queue management should be created in such a way so that the customers who are waiting their turns in the bank can get satisfied. The management of the bank should install more ATMs, stock the ATMs with enough money and repairs and replace faulty ATMs in order to enhance the satisfaction of their customers.	his study is focused on ATM Service queues only.
5.	Kale, Ajinkya, et al.(2017)[2]	An Automated Human Queue Management using Conveyor Belt, Sensors and controller at Public Places, Holy Places or Shrines	1.To find a new system to control and manage queue automatically and efficiently. 2.To manage the queue automatically by using mechanism of automatic conveyor belt, sensors, microcontroller etc.	Descriptive study	This paper defines a strategy to control and manage the customers automatically. This will also focuses on the methods which are more appropriate to handle the queue management system as compared to human queue management.	This study is limited to queue management using the tools of managing queue at holly places.

Table 1 Cont...

6.	S. Sasikala, et al. (2017)[13]	Bulk Queuing System with Multiple Vacations, N-Policy, Balking and Control Policy on Request For Re-Service	1.To find out the probability generating functions of various completion epochs, queue length and system length. 2.To study the steady state behaviour of queueing system with control policy.	1.Probability Distribution 2.Descriptive study	The author has examined various tools which are strengthen for queue management system. the author has also has approaches and focuses on the various segments of queue management system to control and monitor the behaviour of the customers.	Focuses only on Multi Vacations, N-Policy, Balking and Control Policy.
7.	V.Rema, et al. (2017)[17]	Modelling of Queuing System at Sales Checkout and Analysis of Consumer Behaviour: An Empirical Study ay a Supermarket in Bengaluru.	1.To ascertain the key factors affecting customer purchase behaviour at supermarkets. 2.To determine the impact of store loyalty program on customers of different age groups 3.To analyse the effectiveness of the queuing system by measuring its operating characteristics and its implication on customer satisfaction.	1. Observation 2.Questionnaire 3.Random sampling 4.Percentage analysis 5.Correlation Analysis	This paper integrates analysis of dimensions of buying behaviour, loyalty and satisfaction of customers at a popular supermarket. The key drivers of buying behaviour are analysed. This research therefore provides better insights to understand the overall shopper's behaviour, loyalty and satisfaction derived through analysis of waiting lines at the checkout counters in supermarkets.	This study is limited to queuing system at a one supermarket in Bengaluru
8	Indhira, k.Sasikala (2016)[2]	Bulk Service Queuing Models-A Survery	1.Finding the performance measures of a queueing models. 2.Provide an overview about bulk service queueing models.	1.Markov-chain technique 2.Z-transform 3Phase method	Study of bulk service queueing models which are used to predict the system in advance and thus, can avoid loss. There is requirement of more work in field of Bulk Service Queueing Models.	The study is limited to Bulk Service queueing model.
9	Jhala ,Nityangini (2016)[3]	Application of Queuing Theory in Banking sector	1.Determination of waiting and serving cost with a view to determining the optimal service level. 2.A methodology designed to support the decision-making process by the banks to meet the demand.	1.Direct observation 2.Personal Interview 3.Questionnaire	The study shows that the average waiting time of customer is high as compared to optimum time hence it is observed that a particular queue management system should be applied to minimise the waiting time of a customer and maximise their satisfaction. this can only be approved or minimised with the help of robotic process automation.	The study is in respect of Banking Sector only and has very limited application.
10	Mala and S.P. Varma (2016)[6]	Waiting Time Reduction in a Local Health Care Center Using Queueing Theory	1.The goal of the study is to reduce the waiting time of patients in the clinic and also to optimize its existing capacity. 2.The finding obtained after investigation from one unit of the medical health centre should be valid in the other units.	1.Observation 2.Probability Distribution	The study shows that the customers are feeling stress during health care activities. the cost of serving customers is also high which needs to be minimised by applying an appropriate model for reducing the queue in the health care sector.	This study concentrates on reduction of waiting time in queues at a health centre.

Table 1 Cont...

11	Pattnaik, Prasant and Pal,Souvik (2016)[11]	A Stimulation-based Approach to Optimize the Execution Time and Minimization of Averages Waiting Time Using Queuing Model in cloud Computing Environment	1.To find out the minimum execution time with respect to number of CPUs. 2.To study the queuing model in cloud computing environment in engineering sector.	1.Poisson Distribution 2.Exponential Distribution 3.Numerical Analysis 4.Analysis	The research concentrated on simulation based robotic process automation. the focus is also given to minimise the time during service but appropriate evaluation and monitoring is not seen. The business environment is also affected through technology which is not clearly defined in this paper.	The study is restricted to stimulation based approach to find minimum execution time in cloud computing environment and has no application in human queuing.
12	V.M, Chandrasekaran, et al. (2016)[18]	A Survey on Working Vacation Queuing Models	1.Study on variants of arrival and service processes with different types of working vacation models. 2.To provide sufficient information to analysts, managers and industry people who are interested in using queuing theory to model congestion problems	1.Descriptive study 2.Markov-chain techniques 3.Probability distribution	This paper has presented short survey of the studies on variants of arrival process and service processes in working vacation queuing models.	Study concentrates on vacation queueing system where the server may not be available for a period of time for its primary function. It has a limited utility during vacation period only.
13	Naik,Girish R. et al.(2015)	Generic Single Channel Multi Phase Waiting Line Model applied to Production line for Productivity Improvement	1.To reduce manufacturing lead time. 2.To analyse idle time, WIP accumulation between machines and identify bottleneck resource. 3.To analyse delays in production system with variable service times. 4.To analyse WIP in line for productivity improvement	1.Descriptive study 2.GUI Analysis	This paper focuses on single channel multi phase queen theory. the author is identified various gaps which are associated with their waiting time and due to this reason the production system is also defective.	This paper is related to multi-phase production line.
14	S. Shanmugasundaram and P. Umarani (2015)	Queueing Theory Applied in Our Day to Day Life	1. To find the basic features of queuing theory, applications waiting time in queue. 2. To find the waiting time in system, motive of the study, etc.	1. Probability Distribution 2. Poisson Distribution 3.Exponential Distribution	The study of queen theory is not only applicable on daily routine life but also focuses on various special activities which are necessarily operated by customers. during the study it has also been focused that the customers are facing stress while they are taking their services hence there is a question to identify the waiting time of the customers.	The study concentrates on queuing of daily life of human being but also in sequence of computer programming, networks, medical field, banking sectors etc.
15	Parimala,R. and Palaniammal,S.(2014)	Application of Queuing Theory In Bank Sectors	1. To find out fundamental information regarding queuing systems in banking sector. 2. To find out the waiting time and length of queues which may include the variables like, arrival, waiting and departure time of customers, service time of servers, etc.	1. Observation 2. Descriptive study 3. Probability Distribution	This study focuses on the customers satisfaction while taking their services in banking sector. the customers were found to be stressed with human intervention.	This Paper is restricted to only banking sector.

Table 1 Cont...

16	Senthamarai Kannan, K and Jabarali, A (2014)	Parameter Estimation of Single Server Queue with Working Vacations	1. To find the estimation of single server queue with working vacation policy. 2. To study the estimation of queue size and waiting time in queue.	1. Descriptive study 2. Probability Distribution 3. Parameter Analysis	In this paper, the maximum likelihood estimation of single server queue with working vacation policy is worked out. Form these results, the expected queue size decreases when the vacation parameter, service parameter during the vacation period and inter-arrival parameter increases. Working vacation is a reasonable one to compare with classical vacation.	The study is limited to server queue with working vacation policy and waiting time in queue.
17	Sood, Sandeep K. (2013) [14]	Dynamic Resource Provisioning in Crowd Based in Queuing Model	1.To automate the dynamic allocation of resources by minimizing the mean amount of resources used and meet the performance goals of individual applications as specified in their service level agreements. 2. To determine the best possible configuration for the data centre.	1. Observation 2. Probability Distribution 3. Poisson Distribution	this studies focuses on the cloud based queen model. this model who was developed to identify the factors affecting queue in the process of queue modelling. yes was also given to identify the performance and minimising the waiting time of the employees by applying an appropriate model.	This paper is related to resource allocation methodology for a cloud computing infrastructure.
18	Singh Somvanshi, Thakur Vats Singh,et al.(2012) [13]	Application of Queuing Models In Effective Library Management	1. To discuss the application of Queuing models as applicable to library and information fields. 2. To solve the intricate problem of circulation of book, counter service and allied services etc.	1. Probability distribution 2. Simulation Models	There are different and several practices are prevalent in libraries which required application of different complex formulas as per complex human behaviour. I such situation it is advisable to start off with simple models and introduce complications one by one, until sufficient accuracy is obtained.	This paper deals with the queuing model in library only.
19	Tabari.M, et al. (2012) [15]	Application of Queuing Theory to Human Resource Management	1. The study to recognize the optimal number of required human resources in an educational institution carried out in Iran. 2. To use multi-server queuing to estimate the average waiting time, queue lengths, number of servers and service rates.	1. Poison Distribution 2. Probability Distribution	This paper defines the use of technology in human resource management. This paper defines the application and control aspects of technology in the educational institutions. this paper also focuses on the waiting time in queue management system to minimise human intervention and provide better opportunities to employee for their job skills.	Study concentrates only on application of queuing theory on Human Resource Management in Educational Institutions in Iran.
20	Lakshmi, Vijaya and Bindu, Shoba (2011) [1]	A Queuing Model for Congestion Control and Reliable Data Transfer in Cable Access Networks	1. To implement simple queuing theory models which can model the average response of a network of computers to a given traffic load has been implemented 2. To know the effect of investment and advancement on the waiting time by applications of queuing models.	1. Probability Distribution 2. Parameters	The present research is focused on the various parameters of data transfer through cable. the major problem was identified in traffic pattern and their channel capacity due to the human intervention	The Study relates to Cable Access Network and implementation of the network.

3. Review of Literature

A literature review is survey of literature already available such as books, journal articles, thesis etc. on a given subject or topic and contains a comprehensive and analytic summary of such already available material. Literature review is secondary source of data and information and no new work is reported. Literature review provides theoretical base for all the researches and critically evaluates the current studies and knowledge.

An effective literature review should provide a context for the research identifying pivotal works and scholars in the field. It enables the researcher to learn and add knowledge from previous theory on the subject.[17–22] Following table shows the reviewed literature:

4. Conclusion

The robotic process automation is required to minimised the waiting time and to increase satisfaction among customers as well as employees. With the help of robotic process automation, an organization can increase their efficiency, capacity, and utilisation of resources in all the segments available. The robotic process is not only applied in a phase of organization but it can be applied in different divisions sectors and phases. the role of robotic process automation is wide in this technological era, as a matter of customer that they feel stress due to human intervention in the shopping mall at the time of their payment. this process can merge all the business activities under a system which will be more transparent, more reliable, and more authenticated in making policy evaluation and appraisals for their employees.

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. Ahuja A, Jain A, Jain M. Finite Population Multi-Server Retrial Queuing system with an Optional Service and Balking. *J Comput Appl*. 2018;41(1):54–61.
2. Indira K, Sasikala S. Bulk service queuing models-A survey. *J Pure Appl Mathematics*. 2016;106:43–56.
3. Jhala N, Bhathawala P. Application of queuing theory in banking sector. *J Mathematics*. 2016;12:73–5.
4. Kale A. An Automated Human Queue Management using conveyor Belt, Sensors and controller at public places, Holy places or shrines. *J Res Appl Sci Eng Technol*. 2017;5(9):2616–20.
5. Lakshmi GV, Bindu S. A queuing model for congestion control and reliable data transfer in cable access networks, . *J Comp Sci Inf Technol*. 2011;2(4):1427–33.
6. Mala SP. Waiting time reduction in a local health care centre using queueing theory. *J Mathematics*. 2016;12(1):95–100.
7. Muddasir A, Jayalalitha G. Analysis of single and multi-server queuing models with balking and reneging. *J Anal Exp Model Anal*. 2019;9(11):144–7.
8. Naik GR. Generic single channel multi-phase waiting line model applied to production line for productivity improvement. *J Mech Civil Eng*. 2015;12(3):90–100.
9. Osaremwinda O, Oghenemega E. ATM Service Optimization Of Banks: Queuing Modelling Approach. *J Econ Finance*. 2018;2:37–51.
10. Parimala R, Palaniammal S. Application of queuing theory in banking sectors. *J Develop Res*. 2014;12(2):2783–9.
11. Pattnaik P, Pal S. A stimulation based approach to optimize the execution time and minimization of averages waiting time using queuing model in cloud computing environment. *J Electr Comp Eng*. 2016;6(2):743–50.
12. Rao A. Queuing Time Shopping Time of D-Mart customers with special Reference to Guntur city. *J Recent Technol Eng*. 2019;8(1):2824–7.
13. Sasikala S. Bulk Queuing System with Multiple Vacations, N-Policy, Balking and Control Policy on Request for Re-Service. *J Pure Appl Mathematics*. 2017;115(9):459–69.
14. Shanmugasundaram S, Umarani P. Queueing Theory applied in our day to day life. *J Sci Eng Res*. 2015;6:534–41.
15. Kannan S, Jabarali A. Parameter estimation of single server queue with working vacations. *J Statistics*. 2014;2:94–8.
16. Somvanshi S, Vats T. Application of queuing models in effective library management. *Econ Business Manag*. 2012;1:25–8.
17. Rema V. Modelling of Queuing System at Sales Checkout and Analysis of Consumer Behaviour: An Empirical Study ay a. *J Adv Res*. 2017;66(5):311–24.
18. Chandrasekaran VM. A survey on working vacation queuing models. *J Pure Appl Mathematics*. 2016;106(6):33–41.
19. Sood SK. Dynamic Resource Provisioning in crowd based in queuing model. *J Cloud Comput Serv Sci*. 2013;2(4):314–20.
20. Tabari M. Application of queuing theory to Human Resource Management. *J World Appl Sci*. 2012;6(1):1211–8.
21. Tailor RK. Application of Robotic Process Automation in Queue System of Shopping Malls in India. *Int J Adv Res Commerce*. 2020;3:2581–7930.
22. Tailor RK, Khan S. Robotic Process Automation(RPA) in the Aviation Sector, Global Air Transport Management and Reshaping Business Models for the New Era; 2022. p. 20. Available from: https://www.igiglobal.com/viewtitlesample.aspx?id=306523&ptid=290553&t=Robotic%20Process%20Automation%20.

Author biography

Sunita Kumar, Student

R. K. Tailor, Associate Professor

Cite this article: Kumar S, Tailor RK. Waiting line theory with robotic process automation (RPA) in shopping malls: A literature review. *J Manag Res Anal* 2022;9(4):201-206.