

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

FINAL REPORT OF THE WORK DONE ON THE MINOR RESEARCH PROJECT

1. *Project report No. 1st /2nd /3rd /Final:* **Final**
2. *UGC Reference No.:* MRP(S)-0291/12-13/KLMG003/UGC-SWRO dated 23-Sept-2013
3. *Period of report:* **From 01-10-2013 to 30-09-2015**

Title of research project: STUDY OF CUSTOMER AND SERVER INDUCED INTERRUPTIONS IN QUEUEING SYSTEM WITH APPLICATIONS IN WIRELESS NETWORKS.

4. 5. (a) *Name of the Principal Investigator :* **Dr Varghese Jacob**
(b) *Department :* **Dept. of Mathematics,**
(c) *College where work has progressed :* **Government College, Kottayam.**
6. *Effective date of starting of the project :* 01/10/2013
7. *Grant approved and expenditure incurred during the period of the report*

- a. *Total amount approved:* : **Rs. 1,70,000/-**
- b. *Total expenditure:* : **Rs. 1,70,000/-**
- c. *Report of the work done :* Please see the attached sheet

i. *Brief objective of the project*

In the literature of queues with interruptions, the study of customer induced interruptions have been first introduced and studied by Jacob, Chakravarthy and Krishnamoorthy (2010). The purpose of this work is to extend the service interruptions in a queuing models to a general aspect.

ii. *Work done so far and results achieved and publications, if any, resulting from the work.*

iii. *Has the progress been according to original plan of work and towards achieving the objective; if not, state reasons*

Yes, the objectives have been achieved according to the original work plan.

iv. *Please indicate the difficulties, if any, experienced in implementing the project*

Nil

v. *If project has not been completed, please indicate the approximate time by which it is likely to be completed. A summary of the work done for the period (Annual basis) may please be sent to the Commission on a separate sheet*

NA

- vi. *If the project has been completed, please enclose a summary of the findings of the study. Two bound copies of the final report of work done may also be sent to the Commission*

In this study we considered a single-server queueing system with customer and server induced interruption of service. All underlying distributions are assumed to be exponential that are independent of each other. A finite buffer BIP, of capacity K , for self interrupted customers to wait for completion of interruption and another buffer BIC, of the same capacity, for those who have completed interruptions, are introduced. The combined maximum customers held in BIP and BIC together is K for reasons obvious from the formulation of the model. The steady state analysis of the model is performed using Matrix Geometric Method. Expected number of server induced interruptions during a single service and the Lapalace-Stieltjes transform of the waiting time distribution in the primary queue is computed. Several performance measures are derived. Numerical illustration of the system behaviour is also performed. An optimization problem of interest that determine the optimal capacity of the buffer for interrupted customers, so as to maximize the Expected Total Profit when all other parameters stay put are investigated.

- vii. *Any other information which would help in evaluation of work done on the project. At the completion of the project, the first report should indicate the output, such as (a) manpower trained (b) PhD awarded (c) publication of results (d) other impact, if any*

One research paper is submitted for publication in a peer-reviewed international journal (Neural, Parallel and Scientific Computations , Dynamic publishers, USA).

Signature of the Principal Investigator

Principal