

### **Applicability of Modified Markovian Queueing Model for Economic Recession due to COVID-19**

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Businesses often offer lucrative deals and discounts so that customers feel encouraged to engage with those firms. Such arrivals are termed as encouraged arrivals. As a pandemic is overwhelming the world, it could be suggested that, for upbringing of declining businesses, this concept, now, deserves to be taken into account than ever in the past. Considering customer management, queueing theory deserves to be paid special attention as on many occasions waiting lines are formed when the arrival rate of customers outpaces the service rate of firms. Among many variations of queueing systems, as one of most practical applications of waiting lines, we decided to study the behavior of a queueing system having multiple service points. In order to describe mathematically the encouraged arrival process, Markovian queueing model is used and the parameter that represents the arrival rate is modified with percentage increase in the arrival rate of customers. We have investigated the behavior of measures of performances with and without encouraged arrivals for this queueing system. In the analysis it was possible to identify that a significant number of customers compared to the normal arrival process is engaged with the system when it is affiliated with the encouraged arrival process. It also shows that customers engage more and more with the system irrespective of the high rates of arrivals and low rates of services. In addition, it was uncovered that the profit increment due to encouraged arrivals is significantly higher than that due to normal arrivals. Considering all these aspects, it can be concluded that the concept of encouraged arrivals is preferable for upholding declining business and further developing undeveloped business. Furthermore, this concept could be taken into the consideration to successfully face the economic recession in this era due to COVID-19 pandemic.

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