11/17/2019

Will Jennings, Elizabeth Jennings, Michael Edwards

Edwards and Jennings Corp.

Convention Simulation

Determine how many lines you need!

Thank you for giving us the opportunity to make this report for your convention. We have done some simulations of your queuing problem. With what you have given us, that the convention center is expecting anywhere around 1,000 on-site registrants who will arrive approximately uniformly, we were able to determine a good amount of queues that you would need in order to compensate for the large crowd, to fit as many registrants into your open time of 8 A.M. to 6 P.M. We came up with a few different situations to give good ideas.

For the time we used for registrants to register at the front of the queue, we used a negative exponential probability distribution around 4 minutes and 30 seconds, with limiting no registrant being quicker that 1 minute and 30 seconds because no registrant should be able to realistically complete the process before then, and even though this was not a requirement, we put an upper limit of 10 minutes on the registration process as no one should realistically take longer than that.

In accordance to the requirement set prior to the creation and use of this simulation of not having a queue containing more than five registrants at a time, we decided that, with the time interval of how long in between each person arriving in at the convention that we used, a max of 90 seconds and minimum of 0 seconds between each arrival, that the convention would need six windows. We did tests with five windows, and every time it would go over the five registrant threshold at some point during the simulation, while the simulation of six windows would only get up to four registrants at a windows.

We used 0 to 90 seconds because when you take 10 hours and try to find how often someone would arrive with 1000 people arriving in total, you get that a registrant would arrive every 0.6 minutes, or 36 seconds, however not everyone would arrive every 36 seconds, they would generally be more spread out. We simulated with 0 to 60 seconds first, however the simulation would finish well before the closing time would come, by usually about 2 hours or so.

We made the simulation to where you can change the average rate at which the registration process takes for each registrant, the number of windows you have, the set hours of operation, and the number of expected on-site registrants. With this, more simulations could be done in order to determine a new amount of windows with new information given.

Thank you for using our services, and requesting us to make this simulation for your purposes. We hope you found this information useful to helping you decide the best amount of windows to have for your convention.