

Patent office

In a patent office, applicants submit their patent application, which is evaluated by the examiner in the office and sent back to the applicants with comments. Based on the comments the applicant modifies his/her application and decides whether to reapply. If reapplied, the application goes back to the office for evaluation again. This process continues until the application is accepted or the applicant gives up.

The average number of new patents submitted each week is 8; the time to evaluate an application is on average 2 hours (a week is 40 hours). Approximately 30% of the applications evaluated by the examiner are accepted; 50% are rejected and will reapply and 20% are rejected and give up. The average time to modify and reapply a patent is 1 month.

- Model the patent office as a queueing system (precisely formulate all assumptions);
- Currently the average number of new patents submitted each week is 8; what can be handled at most by the examiner of the patent office?
- Relevant performance characteristics are (among others):
 - the occupation rate of the examiner;
 - the number of patents at the examiner's desk;
 - the number of patents that are reconsidered by the applicants;
 - the throughput time of a patent, i.e., the time that elapses from the first time a patent is submitted until it is finally accepted or given up.

Evaluate such performance characteristics (by analysis or simulation);

- Investigate what happens to the performance when, e.g., the inflow of new patents increases (or decreases), applicants resubmit faster or the examiner works faster.

Present your findings in a clearly written report.