An Index via Traffic Load Movements in Terminal Manoeuvring Area

Objective:
To propose and verify an algorithm as a substitute for First Come First Serve (FCFS) sequencing which helps to reduce the Total Delay Duration and shorten the Total Landing Time of the arrival flights.

Approach
The algorithm developed is the Optimal Time Separation (OTS):
- OTS will control the arrival time of each aircraft by manipulating the speed of the aircraft prior to it entering the Terminal Manoeuvring Area (TMA).
- This is postulated to reduce the number of aircraft put in holding and as a result reduce delay.
The process in setting up the simulation to compare OTS and FCFS sequencing is shown in Figure 1.

Results and Discussion
- Although FCFS provides a fair treatment to all airlines, the efficient outcome in term of landing time and delay duration is not expected.
- The simulation result of FCFS sequencing scenario in AirTop points out that this method generates a substantial amount of time delayed.
- This can be explained by acknowledging that the total delay time will be compounded when an aircraft goes into holding in FCFS.
- On the other hand, the simulation showed that OTS will land all the aircraft smoothly without putting them into Holding Pattern.
- The implication of this approach is actually transferring delay from the TMA to the en route segment.

Conclusion:
It was found that separating arrival flights by OTS values significantly reduced the total landing time and total delay time compared to FCFS sequencing. However, it was acknowledged that future work such as validating the OTS method with real time data is required.