CHAPTER 7

CONCLUSIONS

This chapter presents the contributions and limitations of the study, and scope for further study.

7.1 CONTRIBUTIONS

The explicit allocation of facilities among competing tasks at the stage of system planning and design is referred to as static allocation, whereas the allocation of facilities among competing tasks during operation of system is referred to as dynamic allocation.

Static allocation decreases the utilization of facilities that leads to high investment and operating costs. Consequently, the cost of product / service becomes unaffordable. This has been observed in several real-life situations. Twenty five years back, railway reservations were made manually wherein for each reservation personnel, a few trains were allocated and they were doing reservation only for those trains. This resulted in over and under utilization of reservation personnel and long queues of persons for want of accommodation reservations in trains. At present, the train reservations have been made using computer-based systems. This avoided static allocation of trains among reservation personnel with the slogan “Any train any counter” and improved the quality of service to railway passengers.
Similarly, the adoption of dynamic allocation of transmission channels and routes in a computer network, computer resources like central processing unit (CPU), main memory, cache memory, and secondary memory devices among competing processes and jobs in a Flexible Manufacturing Systems (FMS) improved the utilization of resources. The supermarket model in retail business wherein the customers are facilitated to pickup items personally and get billed at any of the counter is another real-life situation.

The study has revealed that the SRTUs predominately adopted static allocation of buses to schedules. Hence, it has resulted lower bus productivity, high investment on buses, heavy losses and unaffordable prices to passengers. The major contribution of this study is to investigate whether the dynamic allocation of buses to schedules would lead to increase in bus productivity and decrease in bus requirement for minimizing the investment and operating cost. The definite outcome of this study is to adopt dynamic allocation of buses to schedules.

This study has proposed four models given hereunder:

1. A model to facilitate the dynamic allocation of buses to roundtrip schedules at depot level assuming roundtrip times are deterministic.

2. A model to facilitate the dynamic allocation of buses to roundtrip schedules at depot level assuming roundtrip times are stochastic.
3. A model to facilitate the dynamic allocation of buses to one-way schedules at regional level assuming one-way schedule times are deterministic.

4. A model to facilitate the dynamic allocation of buses to one-way schedules at regional level assuming one-way schedule times are stochastic.

It is evident from the results of the first model that the bus productivity is increased by 40.25% due to decrease in bus requirement by 28.69%. If the model is implemented in all 53 SRTUs in the country the projected reduction in investment on buses would be Rs. 4733 crore. This leads to decrease in operating costs and also losses to SRTUs.

The second model which considers stochastic roundtrip times of schedules results almost the same results as that of the first model. Hence, it can be concluded that stochastic nature of roundtrip times does not affect the bus requirement significantly. Therefore, all SRTUs in the country are suggested to use the first and second models for determining the optimal number of buses for operating services as per the schedules of a depot.

It is evident from the results of the third model that the bus productivity is increased by 55.35% when one-way service times of schedules are deterministic. However, the results of the fourth model indicate decrease in productivity beyond 20 minutes of mean lateness. In reality the service time would be stochastic and ensuring the mean lateness to be less than 20
minutes is beyond the control of SRTUs. Hence the applicability of the third and fourth models do not derive benefits more than the first two models unless the mean lateness is less than 20 minutes.

Therefore the first two models are recommended for adoption in bus requirement planning by all SRTUs in the country.

7.2 LIMITATIONS OF THE STUDY

The study of the effect of administrative, operational and maintenance policies / procedures has not been attempted due to the heavy effort and time required in collecting the data.

7.3 SCOPE FOR FUTURE STUDY

It is worth attempting to study the effect of administrative, operational and maintenance policies / procedures due to dynamic allocation of buses to schedules for testing operational feasibility.