CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This research proposes an efficient shuttle bus service system. The current system is using too many buses and delivers some employees late for work. These problems are caused by poor route planning. A new system is developed for the shuttle bus service in Samut Prakarn, which is using currently 9 buses in 9 routes. Data for the area including pickup points, number of passengers, bus capacity, and travelling distance and time are analysed and collected.

While comparing the current problems and its characteristics, the system employs an extension of the Clarke and Wright's Saving Algorithm to design the routes in order to minimise the number of buses and travelling distance. A computer software is also developed to support data management and calculation.

The application of the system results in the use of 7 buses in 7 routes or 22 percent reduction when compared with current system. Total travelling distance of all buses is reduced from 231 km. to 202 km. or 12.48%

The model was refined in order to make the plan more flexible. The initial solution, although more economical in terms of total travelling distance and time, cannot accommodate any additional passengers in all but one bus. Using the same number of buses, the model averages out seat vacancies so that every bus has at least three free seats. The added flexibility to accommodate new passengers results in slight increase in the total travelling distance and time.

6.2. Recommendations

This section explains the implementation of the system developed in this study. It also recommends further work that can add value to this research.

a) Implementation of the system

- The most difficult part of this research is data collection and data generation between each pair of pickup points. This research collects some data from actual measurement and generates some other data from calculation. When there is a new pickup point in the system, travelling data to and from this point can mostly generated from the existing data.

- The results of the system should be tested with the real for verification. Initially, the results can be the guidance for operators to set shuttle bus routes. Adjustments may be needed for practical reasons.

- The proposed system is flexible but may not be enough if there is a big change in number of passengers in a route. It needs to be recalculated if a given route is assigned with additional passengers that exceed its vacant capacity.

b) Extension of the system

There are several areas for future research for the problem reviewed in this paper. One area for future research includes developing time windows for the return trip and performing an overall optimization. Secondly, the variable demand can be considered to obtain optimal routes. Thirdly, the project could be re-analyzed using various bus capacities. It is recommended that sensitivity analysis should be conducted by varying bus operating costs and bus size.

- Difference in travelling time of each route shows that operators can adjust or apply time windows control for each route for making balance in arrival

time. Another possibility is to make some buses travel more than one loop if they are assigned with short loop and have enough time to complete another loop.

- The travelling time between any two points in the model is calculated with a fixed bus speed of 30 km/hour. To make the model more realistic to the actual traffic condition, different and varying speeds may be considered to calculate travelling time.

- In some routes, the buses are planned to travel long distance in order to pickup passengers to fill its capacity. This can be costly and uncomfortable for the passengers. Therefore, various bus capacities should be considered so that smaller buses can be filled up from passengers at lower number of pick up points.