Solving the School Bus Routing Problem at a Local School in Kuwait

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Abstract

The Kuwaiti government provides school busses for all public schools in Kuwait. Areas covered by a bus and the routing of the busses are random decisions made each school year. This had led to students staying up to one hour and sometimes more; going to or returning from schools, and in typical cases, large busses serving a handful of students. The effect of that on their performance is obvious. Further, traffic jams are familiar scenes at the intersections near to schools or leading to schools. Using school busses in Kuwait is necessary as female students are more in numbers than male students and they are less likely to go to schools on foot. In addition, the weather in Kuwait (desert weather) can get too cold in days and too hot in others. We proposed and developed a spreadsheet model to solve the school bus routing problem at a public school in Kuwait. The application was built using the VBA tool in Microsoft Excel, providing a minimal cost, user-friendly interface and utilizing the Clark and Wright 'saving algorithm. Data were collected at a public school for females, and experiments were conducted to decide on appropriate time window for picking students, the suitable travel time, and the number of busses. The results showed the potential of cutting the time to school by around 30%, while reducing the cost of busses by 10%. The application is simply usable to any other school. Those improvements would enhance the students' performance and support the better allocation of the ministry of education resources. Future extensions of the work include linking the application to Google maps or a similar tracking system, and proposing collection points for students to reduce the number of stops and hence the total travel time and distance.

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Spreadsheet modeling, School bus routing problem, Clark and Wright' savings algorithm, Kuwait