MINIMIZING THE COST OF GARBAGE COLLECTION IN DASMARIÑAS, CAVITE (SHORTEST PATH MODEL)

An Undergraduate Thesis Presented to
The Mathematics Department
College of Science
De La Salle University - Dasmariñas
Dasmariñas, Cavite

In Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in
Applied Mathematics

Maria Cristina L. Malicsi
John Joseph C. Parra

January 2008

Table of Contents

List of Tables

List of Figures

ABSTRACT

Objective of the Study

To create a system of garbage collection in Dasmariñas, Cavite at minimum cost in terms of gasoline and labor expenses including the driver's and helper's fee.

Scope and Limitations

This study was limited to Dasmariñas, Cavite where 65% of the areas of the said municipality were observed. The researchers considered 59% or 10 out of 17 trucks are operating in the said municipality. Approximate distance in kilometers of the possible routes obtained from Google Earth was utilized. Some unavailable data including the number of trips per truck and daily route in a day were gathered thru interviews of the garbage truck's drivers. The study focused on the routes of the garbage trucks to verify the shortest path and to obtain the minimum cost of collection.

Methodology

This research applied the following steps: data gathering, data analysis, formulation of the networking model and scheduling of trucks. Most of the data used by the researchers were obtained from the Environmental Sanitation Unit (ESU). The following data were acquired: map of Dasmariñas, the number of dump trucks, statistics of garbage's volume monthly and from previous year, truck's number of trips, schedule and route of collection. They conducted interviews to verify and gather additional data which are the following: the current daily schedule,

daily number of trips and map of the garbage collection. The information gathered was analyzed by the researchers and formed a networking model in terms of the shortest path model. Finally, new schedule of collection were determined.

Summary of Results:

1. This study formed a shortest path model which has minimized cost of expenses for garbage collection in Dasmariñas. From its current weekly cost of P100, 240.98, it was decreased to P95, 021.88.
2. This research presents the new schedule formed from acyclic algorithm.

Conclusion

The researchers were able to minimize the cost of garbage collection system in Dasmariñas, Cavite using the solution for the Shortest-Route Problem. The solution showed the minimized route which can be used by the ESU and computation of the minimized cost involved. The new schedules were also showed.

Recommendation

The researchers would like to recommend by the municipality government that much attention must be given for the improvement of the garbage collection in Dasmariñas to avoid one of the possible threat to the health of the people and the environment. For the improvement of the current system, allocating appropriate budget is recommended to conduct researches related to garbage collection such as determining the volume of garbage collected in the area. Furthermore, the researchers highly recommend that proper monitoring of the schedule be observed,

especially the expenses involved. Because based on this study, they observed that the available information in garbage collection system given by the ESU is insufficient. Since Dasmariñas is a fastest growing municipality and also based on the researchers' observation, Maximum-Flow Model can be applied to maximize the places collected. Thus, the continuation of the study is recommended by extending the scope and limitations of the study thru creating one road network of Dasmariñas.