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# VEHICLE ROUTING AND SCHEDULING WITH MICROCOMPUTERS

by

William E. Hardy, Jr., Professor  
Department of Agricultural Economics & Rural Sociology  
Auburn University, Alabama

## INTRODUCTION AND PROBLEM

Concerns over the high cost of fuels; investment and maintenance required for vehicles; and driver salaries and other labor costs have created the need for increased efficiency in the use of all modes of transportation. Since these costs are included in the price of all goods, efforts to reduce this portion of the total marketing bill should aid in keeping the final price of all products to a minimum.

One major cost area where increased efficiencies could be realized is in the operation of assembly and distribution fleets. Analytical procedures for the design of efficient route networks have been available for the past ten to twenty years. It appears from observation, however, that even though these capabilities exist, many firms have not adopted and implementation of such procedures.

Several reasons may be given to explain why these accepted procedures are not used on a widespread basis. Some are as follows: distribution managers may not be aware of the availability of the procedures. Also, significant time and effort are normally required in the assembly of data for an analysis. Bad results may have been received from using general purpose routing packages that were not designed to fit the specific needs of a business. From a hardware viewpoint, sufficient

computer capacity may not be available. The fear of and general resistance to change might also delay the adoption of the available technology.

## MICROCOMPUTER SOLUTION

The emergence of powerful and inexpensive microcomputers opens the door to solving many of the problems that have slowed the adoption of vehicle routing and scheduling techniques. Major advantages of using these micro systems are as follows: they are inexpensive; they are easy to use and can be mastered by most individuals in a relatively short time; programs may be easily developed that are "user friendly" which will encourage use by computer novices; investment in microcomputer hardware is a single expense as compared to continuous charges that must be paid for time sharing or consulting services; the microcomputer would be available for many uses in the company.

Even with these advantages, complications may still arise when using the microcomputer to solve vehicle routing and scheduling problems. Areas of concern would be in storage capacity and computation time. Existing vehicle routing and scheduling programs require a minimum of 256K of memory for execution. Memory requirements normally increase with problem size and a typical routing application could easily need 1024K. Currently, most microcomputers do not have that capacity.

The computation time burden is also a major problem area. The combinatorial nature of most routing algorithms requires significant computational time, even on mainframe systems. This time would increase drastically on microcomputer.

#### RESEARCH NEEDS

The prominence of the time and storage problems points directly to

the need for additional research. Work is needed which will streamline matrix operations that are currently used in existing vehicle routing and scheduling algorithms. New alternatives must be developed that are both computationally efficient and able to provide satisfactory routing and scheduling results.