Leveraging Telematics and Weather Data to Study the Productivity of Roadside Mowers

Introduction

The Indiana Department of Transportation (INDOT) is responsible for the construction and maintenance of approximately 11,000 centerline miles of state roads, US routes and interstates. Maintenance of roadside vegetation is very important to roadway safety as it provides better sight distance for drivers and prevents development of trees in the clear zone. Mowing operations along the state rights-of-way to manage vegetation consume considerable resources. Mowing activities are usually reported by daily work orders and it is difficult to obtain quantitative information characterizing the utilization and productivity of the mowing operations. This research uses telematics data from commercial sensors to track the daily activity of seven mowers in the Fort Wayne district. Weather data from National Oceanic and Atmospheric Administration (NOAA) was also captured to estimate the weather-related delays.

Findings

During a one-month period, the mowers collectively covered a total of around 1170 miles and an area of nearly 1800 acres of mowing. Crews worked alternative work schedules with extended hours four days a week. On an average 9.5-hour work day approximately 50% of the time is spent actively mowing. Other activities such as crew commute and equipment transport accounted for 7% each, whereas customary breaks, such as lunch breaks, accounted for 10%. Weather delay was minimal with nearly 3%. The simple telematics based metrics and visualization graphics proposed in this study can be used by agencies to provide guidance on resource allocation, scheduling, and comparison with alternative contract mowing. The proposed utilization graphics may be of particular interest to agencies as they provide a concise way of communicating to stakeholders the overall efficiency of the mowing operations and can be used to identify opportunities for efficiency improvements.

Implementation

Data was collected during the first cycle of mowing operations, 29 May to 30 June 2018. Commercial GPS trackers provided timestamped location data at a frequency of 5-second intervals. The built-in accelerometers also ensured that the devices only recorded data when the mowers were in motion. The work hours were characterized into crew commute, equipment transport between locations, mowing and downtime. Based on preliminary analysis from one week of data, activities with speeds less than 6 mph was assumed as mowing. Downtime was further classified into delays due to maintenance, customary breaks and weather-related events.

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