Method of making an early verification of the effectiveness of a traffic accident measure using video image data etc.

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1. Introduction

Traffic safety measure projects should be implemented based on the PDCA cycle, which includes the steps—analyze causes of accidents, study countermeasures, implement them, evaluate their effectiveness, and study and implement supplementary countermeasures—in order to carry out more effective countermeasures. And in order to quickly discover their effectiveness, this PDCA cycle must be implemented as efficiently as possible. And the effectiveness evaluation step in the PDCA cycle has been done by collecting accident data before and after the countermeasure. But to perform an accurate evaluation based on accidents, it is necessary to collect data representing several years, so it takes a long time to make a reliable evaluation.

So the NILIM has developed a method of evaluating the effectiveness of a countermeasure based on speed data obtained from video images etc. and conflict behavior of automobiles to supplement methods of evaluating effectiveness based on accident data.

2. Effectiveness evaluations by analyzing vehicle behavior images

Figure 1 shows the distributions of speeds of automobiles passing the experiment locations before and after taking temporary countermeasures. The speed is interpreted from video images. The temporary countermeasures taken for this experiment were laying a simple Mat with a level difference on the road in order to alert drivers to the road ahead and slow them down, and at the same time, installing attention-getting signs to warn drivers to control their speed and alert them to the danger of rear-end collisions if they change lanes.

It is confirmed that the temporary countermeasures reduced speed. Although it will be necessary to continue to verify the relationship between speed and accidents, it is possible to evaluate the degree of achievement of the targets of the countermeasures (for this experiment, reducing speed) based on the countermeasure work methods which we selected (for the experiment, simple Mat, etc.).

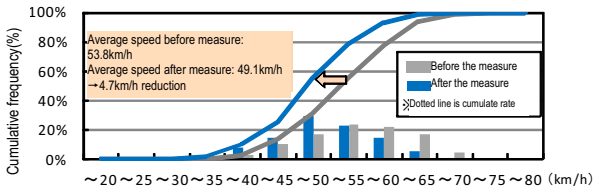

Figure 1. Change of Driving Speed Distribution After Countermeasure

Table 1. Change of Conflict Phenomena Occurrence Frequency After Measure

Conflict phenomenon pattern	Occurrence frequency (times/24 hours)	
	Before measure	After measure
Abruptly changes lanes	21	1
Rapidly nears leading vehicle	1	0
Total	22	1

Table 1 organizes changes of the frequency of conflict phenomena. It treats dangerous phenomena accompanying avoidance actions such as emergency braking or emergency steering as conflict phenomena. The frequency of conflict phenomena is totaled by the same survey personnel visually confirming video images both before and after temporary measures are taken.

It revealed that conflict phenomena fell sharply after the measure. But with the correlation of accidents with conflict phenomena not fully confirmed, in order to apply this method to verify the effectiveness of countermeasures, it is still necessary to analyze the accident – conflict phenomena correlation. At the experiment locations, 17 rear-end collisions occurred during the four years that was the criterion for accident data collection periods. If correlation with accident data is confirmed, it will be possible to perform evaluations using the same quantity of data as accident data based on 24 hour video image data.

3. Summing up and future challenges

As explained above, by interpreting speed and other

aspects of vehicle behavior based on image data obtained before and after countermeasures, it will be possible to confirm whether or not the selected countermeasure works are fully effective. And by organizing the correlation of accidents and conflict phenomena it will be possible to quickly evaluate the effectiveness of traffic safety measures.