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# AN EVALUATION OF SECTION CONTROL: ANALYSES OF SPEED BEHAVIOR OF DRIVERS AT A UNIVERSITY CAMPUS

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**Abstract:** Section control, also called average speed control is a traffic safety countermeasure the global use of which has started recently for decreasing speed related traffic accidents and is one of the applications within the scope of smart transportation system. In this study, a mobile section control system together with all the required infrastructure and software was set up in all sections within the boundaries of the Akdeniz University in the city of Antalya with speeding and accident issues after which the average speed values of the drivers were determined with two measurements 1st of which was secret (before period) and the 2nd of which was announced (after period). Data were collected during a 4 month period at 11 different sections with speed limits of 20, 30 and 50 km/h. Statistical analyses methods were used to evaluate the week day results from the system set up along the sections before and after announcement which were then compared for examining how section control affects the speeding behavior of drivers. The analysis of the speed data of this system indicated that it was effective in decreasing the speeds of the drivers. In general, a statistically significant difference at a level of $p<0.05$ was determined between the before/after period speed averages.

**Keywords:** section control, average speed, before/after period, ANOVA test, Duncan test, independent sample t test.

## 1. Introduction

Speeding is one of the primary causes of traffic accidents (Aarts and Van Schagen, 2006). Probability of accidents increases with increasing speeds along with the severity of the accident. Various speed enforcement systems are used in each country for overcoming the speeding problem in traffic and the drivers are fined. However, the objective of the traffic inspections is not to punish the drivers but to decrease the deaths and injuries resulting from traffic accidents (Acar, 2009).

Section control which is one of the speed enforcement systems used for overcoming speeding and accident problems in traffic is a new approach in the global scale. Even though studies evaluating the efficiency of such an innovative approach on speed management are insufficient, results indicating the significant positive impact on vehicle speeds and accident rates were determined as a result of the literature surveys carried out. Studies put forth that section control resulted in decreases in the ratio of vehicles speeding at average and 85 percentile speeds as well as the

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speed differences. More importantly, it was understood that the application is a countermeasure that is especially effective in decreasing the speeding behavior (Simcic, 2009; Speed Check Services, 2009b; Australian Transport Council, 2011; Cascetta and Punzo, 2011; Fleiter *et al.,* 2013; Soole *et al.,* 2012; Soole *et al.,* 2013a; Soole *et al.,* 2013b).When proofs regarding the fact that other camera based applications (e.g. fixed and mobile spot speed cameras) result in behavior changes limited with their proximity, section control cameras yield more efficient results with regard to section safety (Champness *et al.,* 2005). These studies provide an indication for the efficiency of section control. However, (Soole *et al.,* 2013a) indicated the need for carrying out further studies in the future for enhancing the scientific content of evaluations carried out on this topic. As of now, there is a limited number of studies published in peer reviewed journals which focus on the effects of section control on traffic safety (De Pauw *et al.,* 2014).

The region determined for this article was the Akdeniz University campus. Pedestrians and vehicles have to use the same spaces in the campus (Fig. 1) which is an open invitation for "pedestrian strike type accidents".

**Fig. 1.**
*Pedestrians and Vehicles Using the Same Area in The Campus*

In addition, the number of "recorded" accidents is about 10 on average annually according to the examination carried out in the archive of the Safety Unit Directorate of the University. Fig. 2 shows the accidents due to high speeds in the campus. Such dangerous accidents should not be allowed to take place in the campus. There are speed signs and speed bump applications on sections inside the Akdeniz University campus in the city of Antalya in Turkey as measures against over speeding. However, speed bumps cause unnecessary fuel consumption, environmental and noise pollution while also damaging various parts of vehicles (Gunay *et al.,* 1996; Pau and Angius, 2001). This article provides a solution and suggestion for overcoming the speeding issue in an educational campus with a new and effective method. The average speed values of the vehicles are calculated using this method which is applied by setting up the mobile section control system which enables license plate readings at the desired time and section. First of all, the average speeds of commuter drivers during two periods the 1st of which was secret and the 2nd was announced were evaluated by way before and after period speed etudes on weekdays. Afterwards, the average speeds recorded during the before section were compared with the average speeds recorded during the after section, statistical methods were applied and the effectiveness of the system was evaluated at the end of the application.

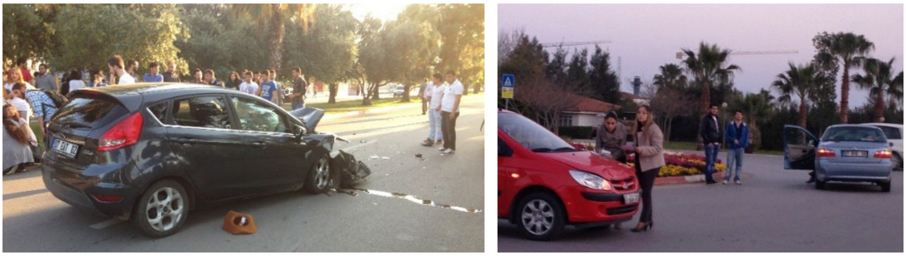

**Fig. 2.**
*Images from Accidents due to Overspeeding in the Campus*

## 2. Background

Carrying out meticulous before/after studies is important for increasing our knowledge on the effects of section safety precautions (Elvik, 2012). The main task of section control is to measure the average speeds of motorized vehicles for speed control and traffic enforcement purposes. This system is a new traffic safety measure with increasing popularity for enforcing speed limits. The advantage of the system is the recording of the average speed along a section which will result in high compliance with the speed limit thereby a decrease in the speed differences between vehicles, increasing the distance between vehicles, a more homogeneous traffic flow and increased traffic capacity. Section control enables a better use of the current infrastructure, results in the decrease of traffic emissions and traffic noise due to the approximation in traffic flow (Stefan, 2005; Collins, 2007; Koy and Benz, 2009; Speed Check Services, 2009a; Cascetta *et al.,* 2011; Soole *et al.,* 2012; De Pauw *et al.,* 2014).

The "average speed" of a vehicle is calculated using data obtained from at least two spots in the system. The cameras should be connected and the clocks on both machines should be synchronized in order to be able to measure the average speed between two points. After that, average speed is calculated by dividing the approved and known distance between the positions of the two cameras (the distance between the two camera fields may vary from 300 meters to dozens of kilometers) with the time it takes for the vehicle to travel between these two points (Cameron *et al.,* 2003; Cameron *et al.,* 2011; Cameron, 2008; Høye, 2014; Montella *et al.,* 2015a).

Section control technology in United Kingdom was first installed in July 2000 on the main connection road of Nottingham with M1 expressway as part of a program in which the additional speed cameras located in eight police districts were being tested. The two cameras were placed about 0.5 kilometers apart on a 40 mil/h road on which the application was being carried out after which both the average speeds and 85% speeds decreased below 40 mil/h along the section (Cameron, 2008).It was determined in Holland that only 0.5% of the vehicles exceeded the speed limit on a section of the A13 expressway after section control was put in use in 2002.The total number of accidents for the same section decreased by 47% which was related with a decrease by 25% in deaths. Even though data were too limited to yield acceptable results, a decrease was observed in the number of losses (Stefan, 2005; Simcic, 2009; Soole *et al.,* 2013a).

There are many studies indicating that section control yields very high rates for complying with speed limits. Violation rates were generally declared as lower than 1% even when daily traffic volumes were high. The studies put forth a decrease in "ratio of speeding vehicles" by up to 90% which indicates that the application is quite effective in decreasing the "speeding behavior" (Gains *et al.,* 2005; Schwab, 2006; Soole *et al.,* 2012; Fleiter *et al.,* 2013).It was expressed when evaluating the compliance ratios related with section control used on the Hume expressway in the Victoria State of Australia that about 1000 vehicles are processed daily for speed violations (within a daily traffic volume that can reach up to 100.000 cars) which makes up a violation rate of about 1-2% (Cameron, 2008; Soole *et al.,* 2012).

The effects of section control put into effect on the A56 urban expressway in Italy on speed and safety have been evaluated. It was observed that the system was more effective in decreasing the speeding behavior. Indeed, decreases from 31% to 9% (a decrease of 72%) in light vehicles exceeding the speed limit by over 10 km/h and from 14% to 4% (a decrease of 84%) in light vehicles exceeding the speed limit by over 20 km/h have been observed (Montella *et al.,* 2015b).

Traffic on a section normally increases from year to year. Therefore, it is normal to have more traffic on a section in comparison with the previous year. The socio-economic development level of the region and the characteristics of the section play an important role on this natural traffic flow. In addition, traffic varies periodically depending on the seasons, months, weekdays and hours within the day as a result of the effects of meteorological factors along with the industrial, commercial, cultural and touristic activities in the region where the section is located. Traffic also varies according to the days in the week. In general, stable and close traffic is observed on urban roads on Tuesdays, Wednesdays, Thursdays and Fridays. Traffic is different on Saturdays, Sundays and Mondays in comparison with other days. The level of difference depends on the characteristic of the road as well as the characteristic of the region with regard to travel, leisure and tourism. Whereas traffic at the city center decreases significantly on Sundays, there is an increase in traffic on Mondays and Fridays (Yayla, 2011). In this study, the average traffic speeds of vehicle drivers who enter an educational institution as commuters on 5 week days (weeks are 5 days for universities in Turkey) were evaluated according to days with regard to before/after periods. No measurements were made on weekends since the number of vehicles entering and exiting the campus was not sufficient.

## 3. Material and Method

### 3.1. Section Control Corridors and their Properties

The pilot region determined for the study was the Akdeniz University campus. Since such areas are regions where a certain group of drivers enter and exit regularly, there is a possibility to measure the average speeds of the same vehicles more than once during field studies. This is also important for ensuring the continuity of the data acquired for the study. The sections where the system was applied were determined via a traffic flow etude pre-study. The test sections were determined in the light of the following issues: "points where accidents due to speeding take place, sections where the tendency to speed are high, sections preferred by commuter drivers in morning and evening traffic determined by way of interviews". Eleven sections of different lengths where mobile section control system has been applied are shown in Fig. 3 and their physical characteristics have been listed in Table 1. The average speed limit values applied on the sections were 20, 30 and 50 km/h.

**Table 1**
*Physical Characteristics of Sections*

| Point pair | Length (m) | Speed limit (km/h) | Number of lanes | | 1 lane width (m) | | Number of intersections | Number of horizontal curbs | Number of speed bumps |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1st point | 2nd point | 1st point | 2nd point | | | |
| A | 908 | 30 | 2 | 1 | 3.50 | 3.50 | 4 | 2 | 3 |
| B | 717 | 30 | 2 | 2 | 3.50 | 3.50 | 3 | - | 3 |
| C | 890 | 50 | 2 | 2 | 3.50 | 3.50 | 1 | - | 1 |
| D | 890 | 50 | 2 | 2 | 3.50 | 3.50 | 2 | - | 1 |
| E | 425 | 30 | 2 | 2 | 3.50 | 3.50 | 2 | - | 2 |
| F | 600 | 20 | 2 | 2 | 3.00 | 3.00 | - | - | - |
| G | 600 | 20 | 2 | 2 | 3.00 | 3.00 | - | - | - |
| H | 615 | 30 | 1 | 2 | 3.50 | 3.50 | 3 | 2 | 1 |
| I | 594 | 30 | 2 | 1 | 3.50 | 3.50 | 3 | 2 | - |
| J | 695 | 30 | 2 | 1 | 3.50 | 3.50 | 2 | 2 | - |
| K | 695 | 30 | 1 | 2 | 3.50 | 3.50 | 2 | 2 | - |


**Fig.3.**
*11 Section Control Corridors*

## 3.2. Outlines of the Installed System

The installed system is comprised of these units; 2 section control cameras, license recognition software, laptop computer (in which the main software is installed), high speed internet provider enabling data transfer, uninterrupted power supply charging the cameras and passenger cars on which section control is mounted (2 units). The cameras were initially mounted inside the trunk of these vehicles (Fig. 4.).


**Fig. 4.**
*Section Control Cameras Mounted inside the Trunks of The Vehicles*

It was realized during trial measurements carried out following the installation that the height of the camera from the ground narrowed down the line of sight for reading the license plates which resulted in technically insufficient results. In addition, it was also thought that since the system in the trunk attracted the attention of pedestrians and vehicle drivers, the secrecy of the before period measurements would be disrupted and as a result it was considered that objective data will not be obtained from average speed data. Therefore, the cameras were camouflaged by way of "sound system luggage" mounted on top of the vehicles and the system was thus setup again (Fig. 5).


**Fig.5.**
*Section Control Cameras Hidden on the Vehicle*

Two lane license recognition cameras were selected for the measurements which covers the vehicle in addition to the lane position thereby capturing a wider angle. The system detects the license plates of the vehicles via uninterrupted video flow method and sends the data to the central server via photograph transfer method. Wireless internet connection was used to transfer the data from the local processor to the main computer.

## 3.3. Data Collection and Method

Two passenger vehicles were parked at spots at suited locations determined on 11 section control corridors by way of geo-coding via GPS devise. The cameras carried out license readings and average speed detection at different section control corridor and points on the vehicles they were mounted on for 5 week days during a period of 4 months between the hours of 08:00-18:00. Average speed detection was evaluated in two different monitoring periods as before period covering the dates between "January 31, 2013 – March 29, 2013" and after period covering the dates between "April 09, 2013 – May 30, 2013". Since the system was set up inside a university campus, different traffic flow instances may occur. Flow rate varies between 0-10 vehicles per lane per minute and the speeds of the vehicles "from 10 km/h up to 90 km/h" were included in the analyses.

The before period study was carried out as unannounced to the drivers throughout the application period in order to be able to measure the effectiveness of the acquired results. At the end of the before period, two announcement e-mails were sent to the university staff and students regarding the dates during which the after period system would be applied, billboards were placed at the entrance gates and leaflets were distributed to the drivers entering the campus. The difference between the before period and after period was that the drivers who were unaware of the application before were informed about the application afterwards. The license plates of the vehicles passing by the 1$^{st}$ and 2$^{nd}$ license recognition spots, average speed, speed limit, whether they exceed the average speed limit or not, data and hour information can be seen and saved in Excel format using the software in the central server at the end of all periods. All data saved in Excel format were uploaded to the SAS (Statistical Analysis Software) and were subject to various statistical analyses in line with the goals of the study.

## 4. Study Results

The number of vehicles for which average speeds were determined was 23060 during the before period and 21089 during the after period. Table 2 shows the sections included in this study and the number of vehicles.

**Table 2**
*Number of Vehicles per Measurement Point Included in the Study*

| Section | Speed limit (km/h) | Section length | Before number of vehicles | After number of vehicles |
|---|---|---|---|---|
| F | 20 | 600 | 806 | 896 |
| G | 20 | 600 | 273 | 232 |
| Total | | | **1079** | **1128** |
| A | 30 | 908 | 659 | 605 |
| B | 30 | 717 | 4962 | 6056 |
| E | 30 | 425 | 6203 | 4804 |
| H | 30 | 615 | 1123 | 766 |
| I | 30 | 594 | 539 | 526 |
| J | 30 | 695 | 2964 | 2134 |
| K | 30 | 695 | 412 | 295 |
| Total | | | **16862** | **15186** |
| C | 50 | 890 | 3820 | 3718 |
| D | 50 | 890 | 1299 | 1057 |
| Total | | | **5119** | **4775** |
| Total | | | **23060** | **21089** |

## 4.1. Analysis of Before Period Average Speed Data According to Days

Table 3 shows the results for the before period measurements carried out secretly via mobile section control set up on 11 sections according to the days of the week. In the light of these results, ANOVE tests were carried out for determining whether there is a differences between the speed averages of the drivers according to days on sections with speed limits of 20, 30 and 50 km/h and Duncan test was applied for determining the level of difference in case of any. Speed data during the before period on week days for sections with speed limit of 20 km/h can be seen in table; all speed averages were above the speed limit. ANOVA test shows that there are no statistically significant differences between the average speeds of the drivers during week days on sections with this speed limit. The speed averages during the before period of sections with speed limits of 30 km/h were above the speed limit. ANOVA test shows that there were statistically significant differences between the average speeds on these sections for drivers on different week days. According to the Duncan test, Tuesday was the day on which highest speeds are attained, Wednesdays were slower, Fridays and Mondays were slow whereas Thursdays were the slowest days. Week day speed averages of sections with a speed limit of 50 km/h were also above the speed limit. ANOVA test shows that there were no statistically significant differences between the averages of the average speeds of drivers on different weekdays on these sections.

**Table 3**

*Before Period Results, ANOVA and Duncan Test according to Days of the Week*

| Days | Speed limit (km/h) | Number of vehicle | Average speed (km/h) | F | P |
|---|---|---|---|---|---|
| Friday | 20 | 195 | 48.83a | 0.69 | 0.5567* |
| Wednesday | | 377 | 47.85a | | |
| Tuesday | | 265 | 47.59a | | |
| Thursday | | 242 | 47.19a | | |
| Tuesday | 30 | 3175 | 36.97a | 44.49 | <.0001* |
| Wednesday | | 2402 | 36.26b | | |
| Friday | | 3269 | 35.43c | | |
| Monday | | 3980 | 35.06c | | |
| Thursday | | 4036 | 34.26d | | |
| Thursday | 50 | 1367 | 54.60a | 1.78 | 0.1302* |
| Friday | | 740 | 54.04a | | |
| Wednesday | | 1534 | 53.98ba | | |
| Tuesday | | 884 | 53.93ba | | |
| Monday | | 594 | 53.30b | | |

*a, b, c, d : Duncan test / *Significant at the 5% level : ANOVA test*

## 4.2. Results of Average Speed Analysis by Days in the After Period

Table 4 shows the results according to weekdays of after period measurements carried out at by mobile section control setup at 11 difference sections. The speed averages of all sections with speed limits of 20 km/h are above the speed limit. ANOVA test put forth that the difference between the averages of the average speeds of the drivers during week days on these sections was not statistically significant. The speed averages of the sections with speed limits of 30 km/h during the after period were above the speed limit. ANOVA test put forth that the differences between the averages of the average speeds of the drivers during week days on these sections were statistically significant. According to the Duncan test, Monday was the day with the lowest driving speeds, whereas the driving speeds on the remaining 4 days of the week were higher. Weekday speed averages of all sections with a speed limit of 50 km/h were in accordance with the speed limit. ANOVA test indicated that the differences between the averages of the average speeds for these sections on different days were statistically significant. According to the Duncan test, Wednesday and Monday were the days with maximum driving speeds, whereas Thursdays were slower, Fridays and Tuesdays were the slowest days.

**Table 4**
*After Period Results According to the Days of the Week, ANOVA-Duncan Test*

| Day | Speed limit (km/h) | Number of vehicles | Average speed (km/h) | F | P |
|---|---|---|---|---|---|
| Thursday | 20 | 235 | 46.62a | | |
| Friday | | 240 | 46.55a | | |
| Monday | | 178 | 45.83a | 1.55 | 0.1858* |
| Wednesday | | 228 | 44.82a | | |
| Tuesday | | 247 | 44.51a | | |
| Thursday | 30 | 3784 | 34.12a | | |
| Friday | | 2768 | 34.09a | | |
| Wednesday | | 2809 | 34.00a | 44.98 | <.0001* |
| Tuesday | | 3657 | 33.96a | | |
| Monday | | 2168 | 31.40b | | |
| Wednesday | | 1502 | 50.66a | | |
| Monday | | 1552 | 50.62a | | |
| Thursday | | 1087 | 49.73ba | 20.93 | <.0001* |
| Friday | | 889 | 49.16b | | |
| Tuesday | | 969 | 49.09b | | |

*a, b : Duncan test / *Significant at the 5% level : ANOVA test*

## 4.3. Analysis of the Before/After Period Speed Data Differences With Regard to the Days of the Week

In this section, Independent Samples t test was carried out in order to examine whether the secret system set up on sections with speed limits of 20, 30 and 50 km/h had a statistically significant effect on the decrease of the week day speed averages of the drivers after announcement. Week day before/after speed data for sections F and G with speed limits of 20 km/h can be seen in the table (Table 5). Speed averages are much above the speed limit in both periods. Tuesday and Wednesday were the days with the highest decrease in speed. Decrease in speed was lower on Friday, the lowest decrease in speed was observed to be on Thursday. Decreases in speed in comparison with the before period were 3,08km/h and 3.03 km/h for Tuesday and Wednesday respectively. Independent Samples t test indicated that the differences for these sections were statistically significant. The speed decrease on Thursday was 0,57km/h and Independent Samples t test put forth that the differences for these sections were not statistically significant. According to the measurements on Friday, there was a decrease of 2.28 km/h. The p value was 0.0486 and the Independent Samples t test indicated that the differences for these sections were not statistically significant due to a slight difference from the significance level of 0.05.

**Table 5**

*Before/After Period Average Speed T Test according to the Days of the Week For 20 Km/H Speed Limit*

| 20 km/h speed limit | Day | Number of vehicles | Average speed (km/h) | Speed difference (km/h) | Standard Deviation | t | p |
|---|---|---|---|---|---|---|---|
| Before | Tuesday | 265 | 47.59 | 3,08 | 12.2400 | 2.76 | 0.0055* |
| After | | 247 | 44.51 | | 12.7272 | | |
| Before | Wednesday | 377 | 47.85 | 3.03 | 11.5578 | 3.11 | 0.0020* |
| After | | 228 | 44.82 | | 11.7429 | | |
| Before | Thursday | 242 | 47.19 | 0,57 | 13.7437 | 0.50 | 0.6190* |
| After | | 235 | 46.62 | | 11.0418 | | |
| Before | Friday | 195 | 48.83 | 2.28 | 11.4328 | 1.98 | 0.0486* |
| After | | 240 | 46.55 | | 12.3348 | | |

**Significant at the 5% level*

Week day speed data during the before/after periods for sections A, B, E, H, I, J and K with speed limits of 30 km/h can be seen in Table 6. Speed averages in both periods were above the speed limit. Mondays and Tuesdays were the days with the highest decrease in speed. Lower speed decrease took place respectively on Wednesdays and Fridays, whereas the lowest speed decrease was observed on Thursday. According to the measurements on Mondays, Tuesdays, Wednesdays and Fridays, decreases in average speed after announcement were 3.66 km/h, 3.01 km/h, 2.26 km/h and 1.34 km/h respectively. Independent Samples t test indicated that the differences between the before and after average speeds on these days were statistically significant. According to the measurements on Thursdays, there was about a 0.14 km/h decrease in the after period in comparison with the before period and the Independent Samples t test put forth that the differences between the before and after average speeds on Thursday were not statistically significant.

**Table 6**

*Before/After Period Average Speed T Test according to Days for 30 km/h Speed Limit*

| 30 km/h speed limit | Day | Number of vehicles | Average speed (km/h) | Speed difference (km/h) | Standard Deviation | t | p |
|---|---|---|---|---|---|---|---|
| Before | Monday | 3980 | 35.06 | 3.66 | 9.5657 | 15.32 | <.0001* |
| After | | 2168 | 31.40 | | 7.6636 | | |
| Before | Tuesday | 3175 | 36.97 | 3.01 | 9.3057 | 13.85 | <.0001* |
| After | | 3657 | 33.96 | | 8.6303 | | |
| Before | Wednesday | 2402 | 36.26 | 2.26 | 9.0244 | 9.26 | <.0001* |
| After | | 2809 | 34.00 | | 8.5687 | | |
| Before | Thursday | 4036 | 34.26 | 0.14 | 8.8128 | 0.73 | 0.4662* |
| After | | 3784 | 34.12 | | 8.6476 | | |
| Before | Friday | 3269 | 35.43 | 1.34 | 9.3776 | 5.72 | <.0001* |
| After | | 2768 | 34.09 | | 8.6649 | | |

**Significant at the 5% level*

Week day speed data during the before/after periods for sections C and D with speed limits of 50 km/h can be seen in the table (Table 7). Whereas speed averages were at first above the speed limit, they remained below the speed limit for the most part afterwards. Tuesday, Thursday and Friday were the days with the highest decrease in speed. Lower speed decrease took place on Wednesday and the lowest speed decrease was observed to be on Monday. According to the measurements carried out on Monday, Tuesday, Wednesday, Thursday and Friday decreases in average speeds after the announcement were 2.69 km/h, 4.84 km/h, 3.32 km/h, 4.87 km/h and 4.88 km/h respectively. Independent Samples t test put forth that the differences between the before and after average speeds on all days were statistically significant.

**Table 7**

*Before/After Period Average Speed T Test according to Days for 50 km/h Speed Limit*

| 50 km/h speed limit | Day | Number of vehicles | Average speed (km/h) | Speed difference (km/h) | Standard Deviation | t | p |
|---|---|---|---|---|---|---|---|
| Before | Monday | 594 | 53.31 | 2.69 | 10.6888 | 5.09 | <.0001* |
| After | | 1552 | 50.62 | | 11.0314 | | |
| Before | Tuesday | 884 | 53.93 | 4.84 | 9.4692 | 10.46 | <.0001* |
| After | | 969 | 49.09 | | 10.3816 | | |
| Before | Wednesday | 1534 | 53.98 | 3.32 | 10.3672 | 8.23 | <.0001* |
| After | | 1502 | 50.66 | | 11.7971 | | |
| Before | Thursday | 1367 | 54.60 | 4.87 | 10.8629 | 11.56 | <.0001* |
| After | | 1087 | 49.73 | | 9.7234 | | |
| Before | Friday | 740 | 54.04 | 4.88 | 9.8620 | 10.10 | <.0001* |
| After | | 889 | 49.16 | | 9.5854 | | |

**Significant at the 5% level*

## 5. Discussion and Conclusion

The before period results secretly measured by the mobile section control set up at 11 different sections are "speeds which the drivers are free to choose". Sections F and G with a speed limit of 20 km/h were sections the speed averages of which have exceeded the speed limit at the maximum amount. It was observed that there were no statistically significant differences between the averages of the average speeds of drivers on F and G sections during week days. Since these sections have alignment geometrical property, have no intersections or speed bumps, there is no speed limitation due to vehicles that are turning or joining the traffic from the side or due to inspection. Even though the speed averages of the F and G sections decreased during the after period, the compliance with the speed limit was at a low level. It is thought that the speed limits on these sections are not considered as reasonable by the drivers and that there is a requirement for an optimal speed limit regulation. Sections with speed limits of 30 km/h have different average speed values on different days and even though their average speeds decreased during the after period, they were still above the speed limit. It is also thought that the speed limit feeling instilled in the driver due to the physical state of each section is also effective in both periods. Week day speed averages during the after period for sections C and D with a speed limit of 50 km/ were in compliance with the speed limit and a statistically significant difference was observed between the average speeds of the drivers on different days. Announcement was effective on these sections during the after period and it is thought that the speed limits were considered to be reasonable by the drivers.

Even though the results seem positive, there is an issue that should not be overlooked. The drivers do not comply to the speed limits at a high ratio. A higher compliance may be attained by way of better communication and information strategy as well as a penal sanction for cases of violation. Hence, another vital characteristic for the successful application of section control is the "speed limit management strategy of the system". In addition, it is thought that speed distribution should be adjusted to driving speeds of 85 percent, section geometry as well as the section development type and level in order to ensure that speed limits provided as 20km/h and 30 km/h are considered as reasonable by the drivers as well as to ensure that they are not frequently overlooked.

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