

# The Use of Lights on the Bicycles: cyclists' perception on safety A case study in Lund

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**The purpose of this research is to analyze cyclists' compliance with rules on lighting during darkness. Behavioural observations and interviews with cyclists were carried out in Lund, Sweden. The results from behaviour study show that 72% of cyclists did not use the lights either front, rear or both lights and 54% of them were totally missing both lights.**

**Key words: cyclists, bicycle safety, safety perception, missing lights**

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## 1. Introduction

The city of Lund has become one of the city in Sweden with high number use of bicycle. The interactions between cyclists and other road users are a complex phenomenon. Road users have to consider the presence of other road users, as they have to share the same space. Not only infrastructures and facilities factors that influencing traffic safety but also cyclists behaviour. Cyclists' behaviour is sometimes influenced by their level of knowledge about the traffic regulation.

Cycling is the same in everywhere, what distinguished cycling in one place with the other place is the regulation. The regulation in the country that gave priority to cyclists certainly will be different from the regulation in another place that did not give the priority to cyclists. Therefore, during the literature studies there is a closer look into the subject of Swedish regulation.

To ensure safety for cyclists, the Swedish authorities have issued some regulations related with cyclists including the obligation to use lights during darkness. To increase other road users' awareness of the cyclists' presence,

cyclists have to make sure that their bicycles are fully equipped with safety devices in accordance with prevailing regulations.

Those regulations related with cyclists are: *Trafikförordning 1998 (SFS 1998:1276)*; *Svensk författningssamling: Riksåklagarens föreskrifter om ordningsbot för vissa brott, 1999 (SFS 1999:178)*; *Vägverkets föreskrifter om cyklar, hästfordon och sparkstöttingar 2008 (VVFS 2008:163)*.

The aim of this research is to analyze cyclists' compliance with rules on lighting during darkness. It evaluates the use of lights on the bicycle.

To analyze it three hypotheses were formed: 1) *More than fifty percent cyclists do not use lights*; 2) *Cyclists do not use lights because of economical reasons*; 3) *Cyclists do not use lights because they do not know about regulations related with the cyclists' obligation to use the lights during darkness*; 4) *There are different perceptions on the use of lights on the bicycles as an illumination tool or just as an existence marker of the cyclists*;

## 2. Methods

Field observations that were carried out in this research consist of behaviour studies and interview with cyclists.

### 2.1. Sites Selection

In a report on pedestrians and cyclists, Lund Municipality counted cyclists flow in 80 places in six different zones in Lund City. The count results show that there are 12 different locations which have high number of cyclists.

Although the locations with the highest number of cyclists in the city of Lund has been known, it should be understood that not all locations have the same number of cyclists during night and day period. Therefore, preliminary survey is needed to find out the location in which the research can be carried out.

The preliminary survey was conducted for 15 minutes period started from 21.00. The observation was begun at 21 o'clock because after 21.00 the situation has been dark enough that cyclists required to use light. The results show that there are 5 locations in Lund City where the research can be conducted.

### 2.2. Behaviour Studies

The studies were conducted every 15 minutes periods for 2 hours from 21.00 until 23.00 in 5 different locations. This study was carried out between May 23<sup>rd</sup> 2009 - May 29<sup>th</sup> 2009 when the dusk began at 20.20.

According to Swedish Road Traffic Act and Regulations (1998:1276), all bicycles must have a lamp showing white or yellow light at the front and showing a red light at the back of the vehicles during darkness. Therefore, this observation is to see if cyclists have applied the regulations properly or not.

Furthermore, the yellow retro-reflectors shall be mounted on the spokes of the wheels (Swedish Road Traffic Act and Regulations, 1998: 1276). Therefore, the study concerning reflectors was divided into two observations, first, the missing front and rear reflectors, and the second, the missing front and rear-wheels reflectors.

Helmet use was also studied as an additional observation to get a picture concerning the connection between the use of the helmet and the obedience of the use of lights and reflectors.

The study also observed cyclists direction to see whether cyclists' trip direction influenced the use of lights and reflectors.

### 2.3. Interview

The interviews took place in five different locations, the locations that are the same as for behaviour observations.

For the evaluation, twenty interviews are carried out for each location so that a hundred interview data are obtained from all five locations. The interviews are conducted randomly which means that all cyclists that passed through the observation locations are stopped.

All respondents must be in circumstances not drunk in this interview process so that the results can be relied on. With consideration that in the weekends more people are drunk, the interviews are conducted during weekdays and are not carried out in the weekends.

During this field interviews four questions are asked – one open question and three closed questions (questions with given answer alternatives). Additional information concerning age, weather and also own observations on the condition of respondents' bicycle have been noted by the interviewer.

### 3. Results

During the observation periods, 896 cyclists were observed, consists of 446 male cyclists and 446 female cyclists.

From 896 cyclists, 646 cyclists were missing their lights, either front, rear or both front and rear lights it means that 72% were missing light cyclists and only 28% of total cyclists who have complete lights.

Furthermore, from 646 missing light cyclists, 54% of them are cyclists with both light missing. It means around 348 cyclists did not use lights at all either front or rear light.

Relating to the gender, there are no significant differences in number between male and female cyclists. There are 325 female cyclists and 321 male cyclists who did not use the lights during darkness.

There is strong correlation between the use of helmets and the use of lights on the bicycles where 68% of cyclists with helmets also have complete illumination equipments on the bicycles.

The interviews took place in 5 locations where behaviour study was carried out. A hundred cyclists had been interviewed during those periods.

About 46 respondents answered always using lights during darkness and 41 respondents are answered sometimes. There is an interesting thing when we make a correlation between cyclists that answered always-use light and the observation towards the completeness of light and reflectors on their bicycle. Overall, there are only 12 cyclists with complete lights and reflectors from 46 cyclists answered always use lights.

In the interview process, it was known that 82% cyclists thought that the function of light was to be seen in the dark. They believed that the city of Lund had good street lights environment so what they only needed is tail light that could make them

be observed by other road users especially by motorized vehicles.

From the interview, it is known that mostly cyclists thought the price of bicycle lights is not a problem for them. Sixty eight percent of interviewed cyclists thought that the bicycle lights are affordable.

Relating to the knowledge of cyclists, 59 cyclists explain the obligation to use front and rear light, including mentioning about the light colour which is white colour for front and red colour for the rear light.

### 4. Discuccion

The research show that the streetlights illuminate enough the road, and that other road users will be able to see their presence which made cyclists felt safe.

From the interview results, there are more than 50% or around 68% of cyclists thought that the bicycle price is affordable. With these results then the hypothesis 1 was rejected.

The results show that, most cyclists knew the obligation to use lights. However if they were asked further in a more detail then we will get various answer. On the other hand, there are still some cyclists who did not know about the regulation who were assumed as students. The 2<sup>nd</sup> hypotheses is then partly approved.

The results from the interview show that 82% cyclists believe that the function of the light is to be seen (as an existence marker). On the other hand, according to the regulations, bicycle front-lights shall have an appropriate illumination so the cyclists could see the road surface forwards. So the third hypothesis is approved.

## 5. Conclusion

The results from behaviour study show that 72% of cyclists did not use the lights either front, rear or both lights and 39% of them were totally missing both lights.

From the results of this research, it could be concluded that economical factor especially the price factor is not became the factor that determined the use of bicycle light.

It is known from the results that cyclists know about their obligation to use the lights. This study also results that cyclists have the knowledge about their obligations to use the lights but during the observation most cyclists did not use the lights properly.

## 6. Recommendations

Considering Lund city as a university city with high number of foreign students, the socialization needs to be done at the time students arrive in the city. In addition, the socialization in writing also needs to be done, especially in locations where the students live. To improve foreign students understanding of cycling regulations then it would be useful if the socialization be written in English.

Furthermore, law enforcement by the police needs to be done regularly. It is expected that the cyclists' compliance with

rules especially on lighting during darkness will increase if there are control from the police.

## Further Reading

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