

# Student Bicycle Sharing System in Zagreb – Studocikl

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**Abstract:** The system of public bicycles in the world known as "Bicycle sharing", is a service in which bicycles are made available for shared use to individuals with or without a certain fee. Users can take and return the bike at numerous locations in the urban parts of the city. As part of the CIVITAS ELAN project (2008 - 2012), which was aimed at improving the quality of life of citizens by establishing high-quality solutions in city traffic and to promote and encourage sustainable, clean and energy-efficient modes of traffic, a pilot project of student public bicycle (Studocikl) was implemented at the University of Zagreb. In the first phase the pilot project included the Faculty of Transport and Traffic Sciences (FTTS) where is currently implemented. In the second phase the project is planned to include the remaining faculties located at the Borongaj Campus. The idea behind the Studocikl project is to connect two remote locations of FTTS, between headquarters in Vukelićeva Street and Borongaj Campus. Registration (login, logout) of users and the entire administration is done through a web portal. Time of using bicycles is in the period from 8 am to 8 pm (working hours of FTTS). Studocikl was officially put into operation on the 17 September 2012 and in this paper will analyse its one-year operation. The paper will also make proposals for further Studocikl development in terms of: installing GPS trackers for satellite bicycle tracking, the application for smartphones, full automation of the registration, and explore the possibility of extending such service and modes of transportation at all faculties in the University of Zagreb.

**Key words:** Sustainable urban mobility, non-motorised transport, bicycle sharing system.

## 1. Introduction

The public bicycle system in the world known as bicycle sharing, represents a public bicycle rental service with or without a fare.

The Civitas Elan project funded by the European Union (2008-2012) had the objective to improve the quality of life by establishing better solutions in urban traffic, achieved by promoting and encouraging sustainable, clean and energy-efficient modes of transport. Within the project, a bicycle-sharing pilot project named Studocikl was implemented in the City of Zagreb. Such a scheme was the first of its kind in Zagreb, directed towards specific users and specific circumstances.

The partners on this pilot project were the Faculty of Transport and Traffic Sciences (FTTS) and an independent civil society named Croatian abbreviation for Sustainable Community Development (ODRAZ). This was a good example of cooperation between a civil society and the university institution.

The pilot project Studocikl was designed primarily for students and faculty staff employed at the Borongaj Campus. One of the ideas for the creation of the project was to provide students easier transportation between two remote locations of the Faculty of Transport and Traffic Sciences.

The service is completely free of charge, and maintenance costs are covered by the FTTS. Currently, the bicycles can be rented and returned after the usage at two depots. The bicycle rentals can be done with the help of staff employed at the reception of the FTTS. The rentals and disposals can be done during workdays (08:00-20:00) and Saturdays (08:00-16:00). At Sundays the service is not available. Bicycles can be used throughout the entire day, but they all have to be brought back within business hours.

This paper presents the implementation of the Studocikl project with all the predicted phases in the project. The technical characteristics, login and logout process, storage, maintenance, legal framework and the

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plans for the future for this project are described in detail.

## 2. The Implementation of the Studocikl Project

### 2.1 General

The implementation of the Studocikl project was originally conceived in two stages:

Stage 1 – Testing (current stage):

- The service was offered to students and the staff of FTTS. The relatively small number of users will be used to test the bicycle sharing system and to eliminate any possible problems that might occur in the stage.

- Stage 1 was estimated to last two years (it started in 17 September 2012)

- During the Stage 1, the preparations for Stage 2 will be done, examining the possibilities of introducing new innovations, new bicycles and bicycle parks.

Stage 2 – extension to all institutions of the Borongaj Campus:

- public bicycle service will be offered to students and staff of the two remaining institutions at the Borongaj Campus: Faculty of Education and Rehabilitation Sciences and Centre for Croatian Studies.

The Borongaj Campus currently consists of three faculties under the jurisdiction of the University of Zagreb: Faculty of Education and Rehabilitation Sciences, Centre for Croatian Studies and Faculty of Transport and Traffic Sciences, with the total of 4,500 students. There are plans which include the construction of the modern campus (for eight faculties) with student dormitories and other facilities in the future.

At the moment, the Studocikl project has three basic features: 20 blue bicycles with logo, two depots for bike disposals and a web portal for login and logout.

The Studocikl project offers 20 bicycles with logo. All the bicycles meet the requirements of Croatian legislation. The design is the same for each bicycle (blue colour, unisex framework, two baskets), adapted for users (in this case, students). Each bicycle is equipped with a locking mechanism, ensuring each user to meet his or her demands.

Users can get and return the bicycles at any of the two locations (depots). The first station is a small object located at the central part of the Borongaj Campus (Fig. 1). The Studocikl project was provided usage of the object by the University of Zagreb [1], and the same object was renovated within the Civitas Elan project [2]. The second station is a metal container located at the Vukelićeva Street, in front of the faculty building (Fig. 2). The usage of the object was provided by the faculty itself. Both objects are in the vicinity of corresponding buildings of FTTS, and they are monitored, secured and protected from possible thefts, vandalism and weather conditions. As a supporting entity in the Civitas Elan project, the City of Zagreb provided surface for bicycle park equipped with bike racks in front of the FTTS building in Vukelićeva Street. The bicycle park ensures the users dwelling at the faculty to easily and safely dispose their bicycles (Fig. 4).



Fig. 1 Bicycle depot at Borongaj Campus.



Fig. 2. Bicycle depot at Vukelićeva Street.



Fig. 3 An example of bicycle for rental.



Fig. 4 Bicycle park in front of FTTS (Vukelićeva Street).

Figure 5 shows the usual routes for each mode of transport available. For each route between the bicycle stations, route length and travel time is also given. The air distance between the stations is 2.5 km. If the users travel by car, the length is 4.1 km, and the route can be crossed in 7 min. If the public transportation is used, the distance is 5.5 km crossed by 35 min. It should be noted that passengers travelling by public transport have to make a transit between tram and bus. This can raise travel time up to 50 min, which would be the same

as if the shortest route was crossed on foot. Users who travel by bicycle usually need 12 min to cross the distance of 3.5 km.

The Studocikl web portal is an application developed to satisfy the needs of the faculty staff related to the project.

The web portal can provide the following activities:

- Continuous monitoring of bicycle depots is allowed in real-time to provide information about currently available bicycles and depot occupancy online,
- Users are allowed to create a profile on the portal. By logging into the portal, the users can make bicycle reservations for the specific time period, monitor their activities and edit their profiles,
- The users can make suggestions (e.g. locations of new stations),
- Administrators can keep track on bicycle rentals,
- Advertising is supported by social networking (Facebook, Twitter, LinkedIn, Google+, etc.).

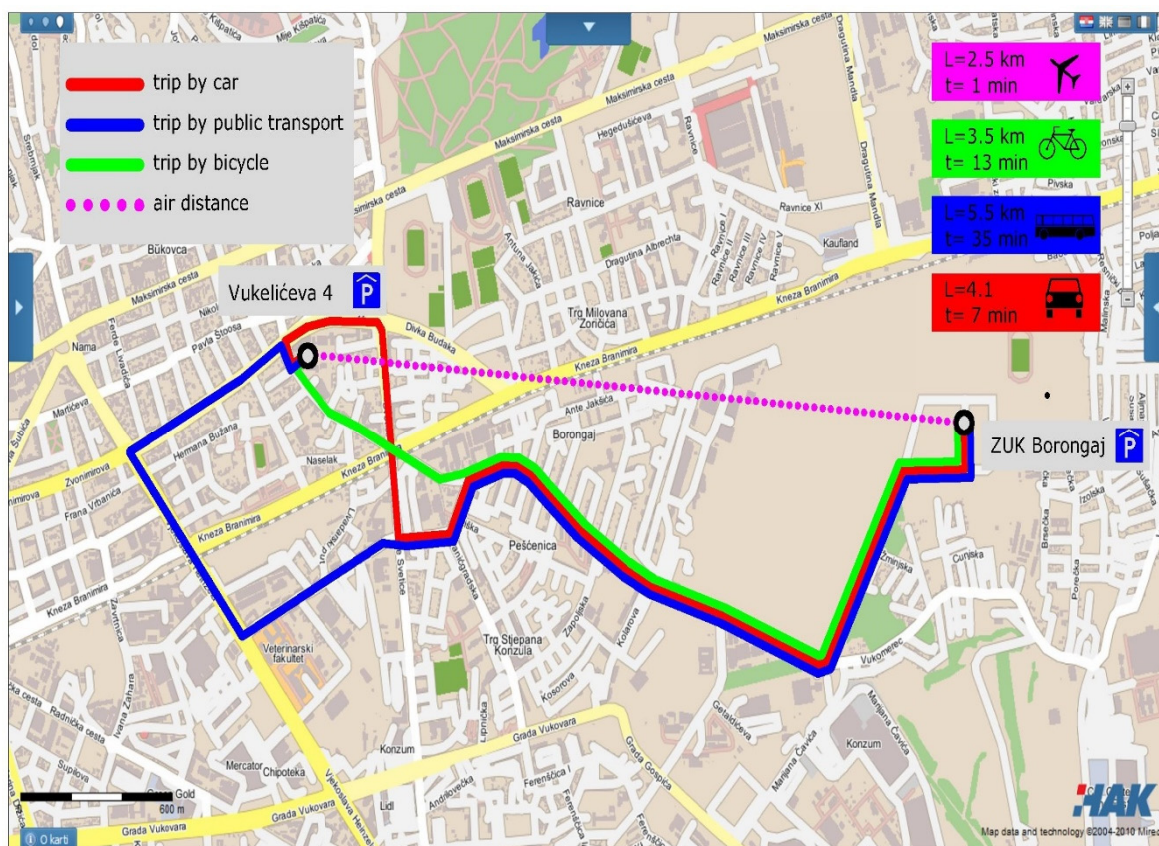


Fig. 5 Comparison of distance and travel times for each mode of transport between Vukelićeva Street and Borongaj Campus. Source: [3]



Fig. 6 Studocikl project on the web.

Source: [4]

The web portal has administrator and public access. With public access, real-time monitoring of bicycle availability in depots is available, and the users have the option to log in, make reservations or to edit profile. The administrator access gives the following privileges: data downloads easy data administration (in case of involving other institutions in the future), bicycle rental monitoring, database searches, editing, or removing certain depots, bicycles or users from the database.

### 2.2 Legal framework and terms of use for bicycles

This section represents the fundamental chapters of the Regulations on the conditions, rights and usage of public bicycle service at the University of Zagreb. The Regulations apply to future cyclists who consent to the usage of services provided by the Studocikl.

Before first use, users have to sign the Statement of the Regulations on the web portal after they have agreed on the terms and conditions clearly visible.

After the signature, the users become registered in the database, and in the case of future bicycle requests they only have to sign the Application of usage. For the users that do not use the on-line application, there is an option to register with the help of the faculty staff at the reception. In that case, the hard copy of the Regulations and the Application of usage has to be presented to students in order to get their consent.

The Regulations on the conditions, rights and usage of Studocikl service consists of the following chapters: General provisions, The description of the system, How to access, Obligations and limitations, Damage compensation, Privacy statements, Monitoring and protection and Transitional and Final provisions.

### 2.3 Bicycle rental and disposal

The process of bicycle rental and disposal includes the following:

- The users fill out an application on the web site or

come in person to the faculty reception to request the service. Users have to agree on the terms of Regulations on the conditions, rights and usage of public bicycle service at the University of Zagreb only once – during the registration process,

- the employee at the reception registers the user by web portal. The confirmation of identity is carried out by the student card, student index or ID card. After the registration was successful, the user is granted the key with the specific serial number and permission to go to the depot to unlock access to the matching bicycle,
- After the usage, the bicycle has to be returned to the one of the two depots. The user then comes back to the reception (for the second time in the day) to return the key which terminates the rental process (the user becomes logged out).

#### 2.4 Maintenance and Servicing

Maintenance and servicing is a very important activity in the whole system. Servicing and maintenance is covered by FTTS. There are members of staff employed in the system, whose responsibility is to perform services, maintain the system and relocate bicycles with a van (if uneven distribution of bicycles at depots occurs). In addition to these members of staff, there are members of staff at the faculty reception who act as system administrators, allowing users to rent bicycles. During the first year of use, there were no

significant bicycle malfunctions so the maintenance costs were moderate.

### 3. Usage Statistics

After the first year of use (from October 2012 until October 2013, there were 140 registered users who had rented the bicycle at least once. The FTTS currently has about 1,450 full-time students, 710 part-time students and 179 members of staff (education personnel and others) A total number of 360 rentals were registered. Three quarters of the total number of rentals were made in order to cross the distance between the two depots (the bicycle was rented at one depot and disposed at the other). In the 60 % of the total number of rentals, the duration of the rental was less than 30 min. The average daily rental rate is one bicycle per day. However, if the winter months (due to weather), summer months (due to summer break) and weekends are excluded, the average daily rental rate then becomes 3 bicycles per day. In October 2012, there were 95 rentals, which is the highest number of rentals in one month during the year.

During the course of a year, there was no significant damage on any of the 20 bicycles in the system.

Possible flaws in the data collection process might have occurred because the staff of the FTTS was introducing to the application at the beginning, resulting by incorrect login and logout process.

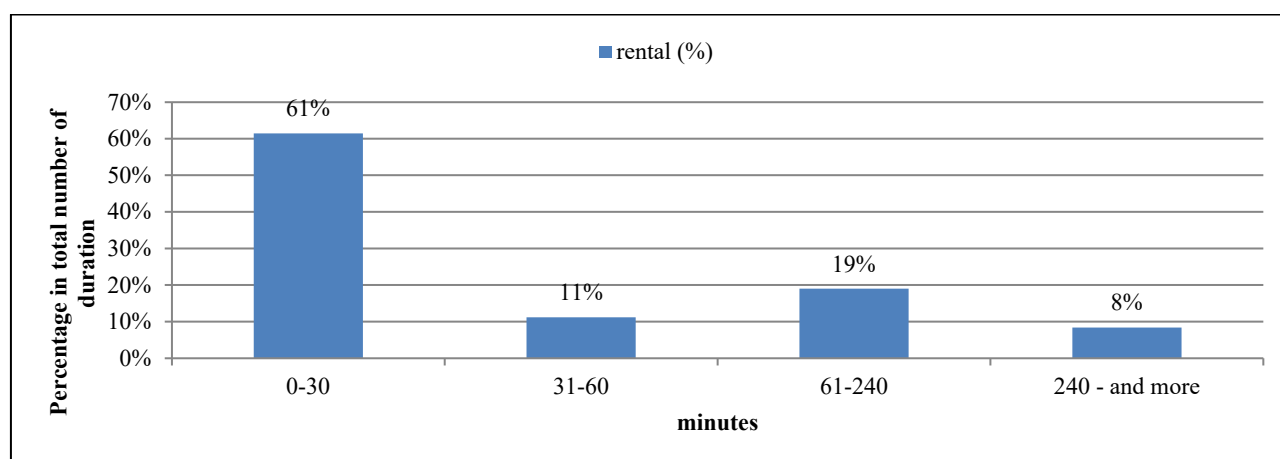


Fig. 7 Bicycle rentals in relation to time of use.

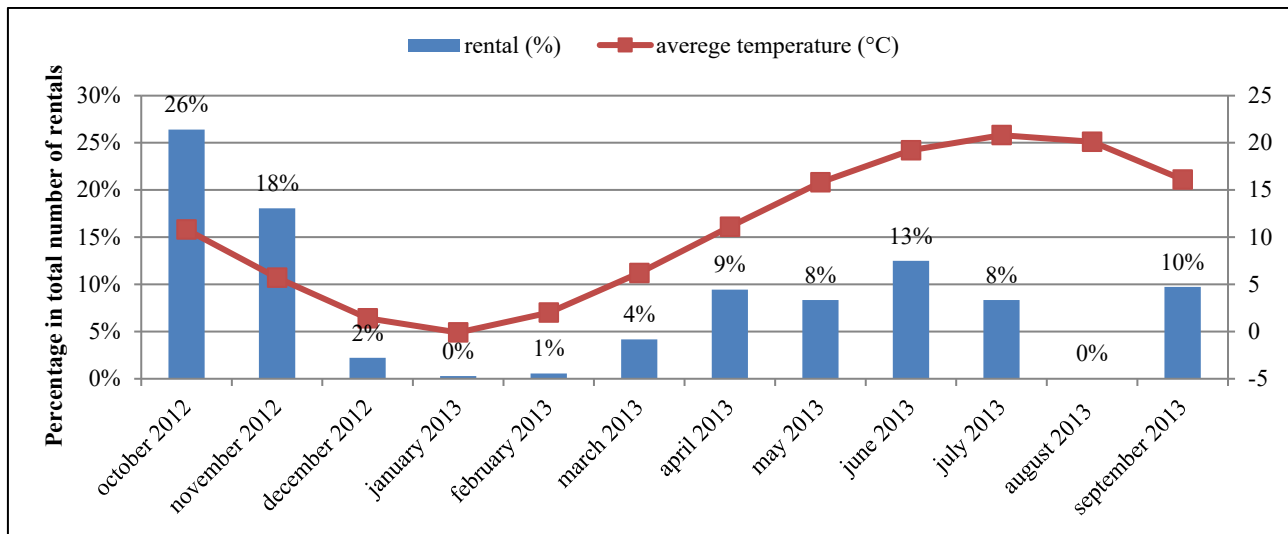


Fig. 8 Bicycle rentals and average temperature in the City of Zagreb for each month in the first year of the project.

#### 4. The Future Development of the Studocikl Project

The future development of the Studocikl project is conceived to have the following events: installation of GPS trackers (this would prevent bicycle thefts, and on the other hand this would provide the data for scientific research, such as the basic bicycle traffic parameters), introduction of smartphone application, full automation of login and logout process, introduction of electric bicycles and expansion of the service to the entire University of Zagreb. In addition, the project is encouraged to promote itself as well as the awareness of bicycle as a mode of transport in general.

#### 5. Conclusion

The bicycle is a non-motorised mode of transport which in most cases is an acceptable solution to traffic and environmental problems in cities. Cycling contributes to good health, reduces costs and it is acceptable from the safety aspect. And because it is environmental friendly, it increases the quality of life to citizens.

The goal of the Studocikl project is not only to provide students with cheap, simple and healthy mode

of transport but also to raise bicycle popularity and to offer current and potential users an alternative mode of transport, both for recreation and daily commuting.

The frequency of the usage (winter and summer months excluded) of 3 rentals per day did not meet the expectations, so the focus of the project is planned to be put on advertising in order to attract more users in the future.

Based on the experiences from the project, the possibilities for the implementation of the project to the entire City of Zagreb and other urban areas in the Republic of Croatia will be analysed. In addition, possibilities to upgrade the system with new innovations will be explored. Further development of the Studocikl project will serve as a platform for FTTS staff to conduct scientific research in the field of traffic and transport.

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