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ANALYSIS OF ALTERNATIVE ROUTES CONNECTING BETWEEN KAZAN FEDERAL UNIVERSITY AND THE UNIVERSITY VILLAGE

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ABSTRACT

In comparison with pedestrian travels, bicycle trips have many advantages: improve joint mobility and cardiovascular fitness, help in releasing endorphins (reduce stress), increase speed of movement, reduces fatigue. Moreover, bicycle trips give a number of options when choosing a route with nice land escapes and roads inside Kazan. Bicycle-route connectivity is an important indicator for efficient a university route network, and can be considered with recreational and commuting purposes. At present, the indices related to bicycle connectivity have become an important concern for designing a complete route network. The aim of this study is to develop a safe route to connect two locations located in the city of Kazan: student residence N8 (2 Derevnya Universiade Str., Privolzhskom region) and the Institute of Management, Economics and Finance (6/20 Kremlevskaya Str., Vakhitovsky region) at Kazan Federal University (KFU). This study considers the Maslow Transportation Pyramid, SWOT analysis, and confirms with interviews to routes' users.

1. INTRODUCTION

The concept of "bicycle zone" was included for the first time in the Russian Traffic Regulations as a part of recent changes made in December 2018. The relevant resolution was signed on 5 December 2018 by Prime Minister Dmitry Medvedev [1].

Before designing (planning) a bike route, it is important to consider major climate factors as solar radiation, atmospheric conditions, and road surface. Kazan has a moderate continental climate with cold winter and warm or hot summer. The average annual temperature is 4.6 °C, while the average annual amount of precipitation reaches 558 mm. It starts snowing in October and the snow remains up to the beginning of May. Windy season coincides with the cold period (from September to March), therefore it is possible to use a bicycle between May and September. However, it is necessary to

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improve bicycle connectivity during this period in the city of Kazan [2].

Active travel ensures the livability of students by addressing environmental and public health concerns. Thoughts about going to a gym are not so interesting and sometimes not affordable for everybody. At the same time, we have an easily realizable alternative: take a bike and rush to the road for amazing impressions and also use it as everyday transport. The 30-minute trip by bicycle covers the daily need of an organism for physical activity, interfering with development of obesity and other dangerous diseases [3].

Cycling is a great way to give our bodies the necessary load. What benefits does cycling bring? The human body is, by definition, designed for an active lifestyle. It is important to give him a regular training. How good it was on your first tricycle to rush down the hill, taking our first powerful portion of adrenaline! Childhood memories are the warmest, but for some reason we lose all that directness of perception in our adulthood. Just imagine the fresh wind, the speed, a sense of freedom, long forgotten because of the daily routine [4, 5].

In September 2015, the Ministry of Transport of the Russian Federation proposed an initiative called the “Let's bike it! Project”, and established the third Friday of May and the 22 of September of each year for carrying out a federal initiative called "Going to work by Bicycle" on a regular basis. The decision was taken by the Ministry of Transport of the Russian Federation on September 21, 2015.

No studies have explored previously the availability of bike parking options or safety bike connections between the campus and KFU student residences. This study analyzes bicycle connectivity and includes bicycle tracks, signalization and parking places between the university village and the campus at 6/20 Kremlevskaya.

2. METHODS

2.1 MASLOW TRANSPORTATION PYRAMID

We tried to cover the basic needs as the prevention of road accidents and also offer a secure bike parking (Figure 1). These factors would give us convenience and comfort when we use the alternative bicycle road [6,7].

Figure 1: Maslow Transportation Level of Service in public transport (after [6]).

2.2 BICYCLE LANES

As you can see in the Figure 2, we have three main bicycle route types [8].

Figure 2: Types of bicycle roads/tracks between Kazan Federal University and the university village

2.3 SWOT ANALYSIS

The strengths, weaknesses, opportunities, and threats of this alternative route transport were identified based on KFU online surveys, literature reviews, and direct observation [9].

2.4 SURVEYS

We applied cross-sectional surveys among students and university staff living at the University village but work or study at 6/20 Kemlovskaya str. Each participant was surveyed only once. However, a person who is both a student and a staff member could be randomly selected a second time to respond to the survey again.

3. RESULT

Maslow pyramid of quality factors was applied to evaluate the reasons for using a bike as daily transport. People priories are in this order:

1. bike parking;
2. bike lanes and tracks;
3. safety accessories (helmet, reflective vest, and others);
4. signals, symbols, and socialization;
5. weather;
6. others.

3.1 PARKING AND LANES

In this study, 80% of the people surveyed prefer bicycle racks (standard parking places) over other bicycle facilities. Parked cars in mixed roads were the most disliked encroachment, perhaps because bicycles operate at a medium speed and can be ridden in different directions. Parked cars are not considered an operating limitation to bicycles, but it is difficult to deal with them during rush hours. Close to half KFU campus lacked of parking racks, at 6/20 Kremlevskaya Str. we have no parking places for bicycles.

After our analysis (see table 1) we can say that we identify three types of cycle track in the route KFU- University village:

a. Mixed traffic (**60**% of the complete route) - Security level 1

b. Road shared (pedestrians and bicycles; **30**% of the CR) -Security level 3

c. Bicycle tracks (just bicycles; **10**% of the complete road). -Security level 4

Table 1: Perceived safety in the different road/track conditions from University village to KFU.

	Mixed traffic	Road shared	Bicycle tracks
Median	1	3	1
Mean	1,5	3,4	1,3
ρ Value	<0,001	<0,001	<0,001

Public Transit Rules (socialization and control), bike signals, cycle tracks and parking places in Kazan showed problems. Principally because we have no administration policy of parking track, usually around the city people put tracks from different sizes and forms, but do not considerate the sidewalk spaces, which is mandatory to normalize bicycle parking environment around the city and of course on KFU.

3.2 KFU: A BICYCLE FRIENDLY UNIVERSITY

We did an initial evaluation of cycling university connectivity (see table 2), we applied internet surveys at VKontakte and Facebook including 200 residents who study or work in 6/20 Kremlevskaya building.

The result of SWOT analysis is given in Table 2. However, from the weaknesses, safety issues are still of main concerns. From the threats, poor road conditions need improvement.

Table 2: SWOT analysis of bicycle university route connections

Strengths	Weaknesses
- Lower cost - Clean fuel consumption - Less range concerns	- Lack of standards - Safety issues (vehicle & traffic)
Opportunities	**Threats**
- Easy to adopt - Compatible with urban life style - Lack of standards (policy) - Value and brand on the market	- New public policy (standards) - Disordered - User quality (training) - Poor roads & traffic conditions

3.3 ROUTE

Kazan federal university bike route (Figure 3) has considerate the existing traffic levels and behaviors. Bike route in Kazan city is lack of bicycle traffic lights. Our route connect a bicycle track already designed by Kazan city government (not yet socialized) with economical institute KFU.

This bike lane adjacent to parked cars on the right-hand side of the street or on the left-hand side of the street in specific situations. Bike lanes typically run in the same direction of traffic, but we have no light signals for bicycles.

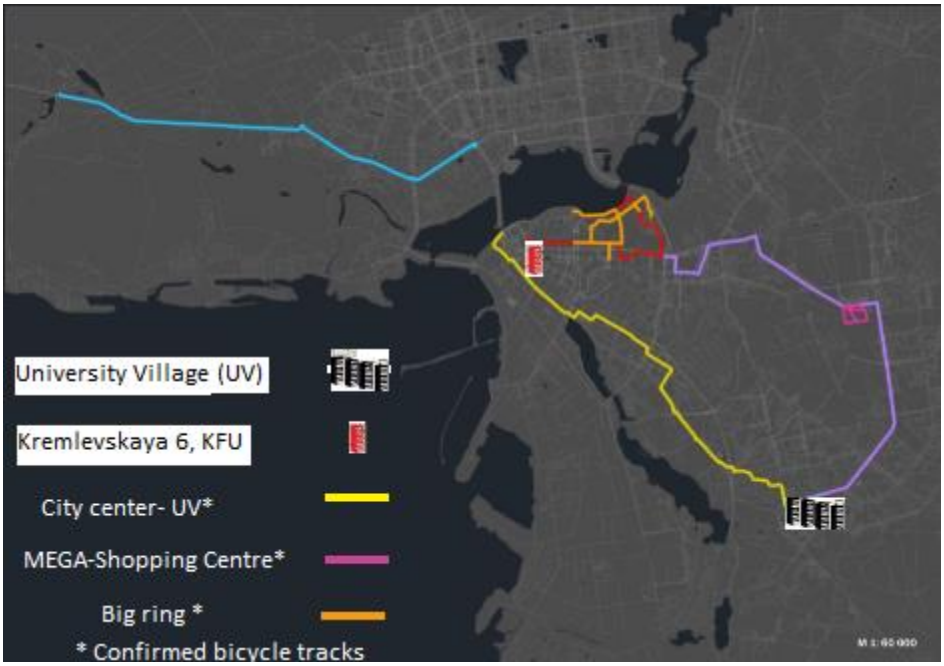

Figure 3: A bicycle friendly University: route connections between KFU campus and university village

In the study of KFU's bicycle environments and student accommodation, half of the students surveyed preferred cycling rails over other bike facilities. There are bus stops too. Less. The most popular offerings were bike parking, security (guard or camera), bike racks and bike parking alternative services (trees, street signals, fences among others). If parking improved, 75% said they would ride more bikes.

4. CONCLUSION

This study considers the Maslow Transportation Pyramid, and SWOT analysis. Bike riding safety has been discussed. The study result has been confirmed with interviews to routes' users. This study has been able to identify connecting bicycle routes between KFU campus and university village. This makes KFU a bicycle friendly University.

5. AVAILABILITY OF DATA AND MATERIAL

Data can be made available by contacting the corresponding author.

6. ACKNOWLEDGEMENT

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