

INVESTIGATING THE PROVISIONS OF BICYCLE USE AND INCLINATIONS OF RIDERS: KONYAALTI (ANTALYA) CASE STUDY

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ABSTRACT

In the context of increasing the diversity of urban transportation vehicles, it is necessary to expand the bicycle use due to the features which provide richness features to daily life, provide benefits both individual and social environment and don't damage to the nature. There are very few bicycle roads in Turkey and Antalya. Firstly, this condition requires correctly understanding the importance of bicycle roads and their implementation.

In this study, the intended use of bicycle, the features of riders and their expectations, the importance bicycle use and identify the problems of bicycle use have been developed with questionnaires in Akdeniz University located in Konyaalti region.

Keywords: Transportation, Bicycle, Antalya, Akdeniz University

1. INRODUCTION

Due to the growing urban population, problems of transportation and traffic are also increasing. In accordance with the technological advancements, an abundance of motor vehicles produced are in use (Figure 1). High rates of private motor vehicle usage cause many problems for both human life, and urban lands (Akay, 2006; Elbeyli, 2012; Forester, 1994; İyınam and İyınam, 1999; Mert and Öcalır, 2010; Uslu et al., 2009; Uz and Karasahin, 2004). Increased automobile use, especially in cities where public transportation is not efficient and available, cause

environmental and urban problems, while having a negative impact on urban accessibility and quality of life (Celik and Akin, 2011; Cengiz and Kahvecioglu, 2016; Ciftci, 2006; Uz, 2003).

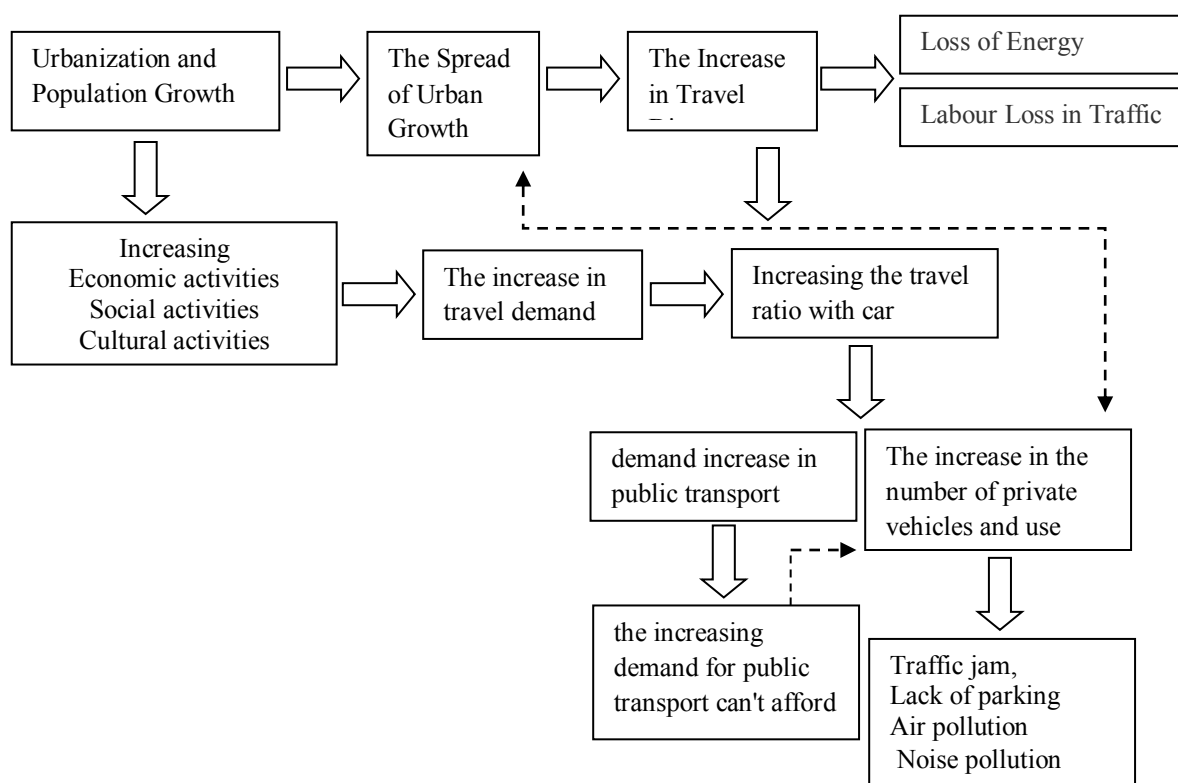


Figure 1. Urbanization and advancements of transportation systems (Candan, 2003; Kaya, 2013)

Recently, in many cities of Turkey, especially in urban reconstruction areas and new construction grounds bicycle roads are planned and put into practice. Turkish Ministry of Environment and Urbanization has issued, “Code of Design and Building of Bicycle Roads, Parking Areas and Bicycle Stations”, on 7. 11. 2015, in order to construct the principles and methods of constructions. In many cities around Turkey, especially in the last bicycle accommodations and roads are being planned and executed.

Konyaalti, as a result of harboring a university campus, construction of new housing units and being a tourism area, is one of the fastest growing urban areas in Antalya. With the increasing traffic of motor vehicles and urbanization, transportation has started to cause problems in Konyaalti.

To this extent, the study has been conducted in Akdeniz University located in Konyaalti region. Investigation aimed for determining the expectations and attitudes regarding bicycle use, of individuals using the campus. The importance of extending the facilities needed for bicycle use, for Konyaalti region, with its world renowned beaches and natural beauty, has been emphasized with this study.

2. MATERIALS AND METHODS

Antalya, with Taurus Mountains stretching along the shoreline in the north, Mediterranean Sea in the south, is the neighbor of Mersin, Konya and Karaman in the east, Isparta and Burdur in the north and Mugla in the west. The area of the city is 20.815 km², and this is the %2.6 of Turkey's total area (Olgun and Erdogan, 2016; Sari, 2012). Moreover, its population is 2.288.456 according to Address Based Population Register System in 2013 (TSI, 2016).

In recent years, Antalya has become a world known city as a result of the rapid progress of developments. With the progress and growing population, increasing number of houses cause a number of problems. Suburban and rural areas near the city have become urban areas, such as Konyaalti, which is one of the most significant districts, with its new buildings, urban spaces and parks (Cinar et al., 2013).

City of Antalya, and especially Konyaalti Region, despite being surrounded with mountains, has a topography that is almost flat (Figure 2).



Figure 2. Konyaalti urban area (Cinar et al., 2013) and topography.

According to the average temperature values of the last 65 years (1950-2015), average maximum temperature is 28.4 0^C recorded in July, and average lowest temperature is 9.9 0^C recorded in January (Turkish State Meteorological Service, 2016) (Table 1).

Table 1. Weather pattern data of the years between 1950 - 2015 (Turkish State Meteorological Service, 2016)

Antalya	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
The average values over many years (1950-2015)												
Average temperature (°C)	9.9	10.4	12.7	16.2	20.5	25.3	28.4	28.2	24.8	20.0	14.9	11.4
Average sunshine hours (hour)	5.1	5.8	6.7	8.0	9.7	11.4	11.7	11.2	9.7	7.8	6.3	4.9
Average number of rainy days	12.7	10.5	9.0	7.1	5.5	2.7	0.6	0.6	1.8	5.8	7.8	11.7
The highest and lowest values in long period (1950-2015)												
Maximum Temperature (°C)	23.9	25.9	28.8	36.4	38.0	44.8	45.0	44.6	42.1	37.7	33.0	25.4
Minimum Temperature (°C)	-3.4	-4.6	-1.6	1.4	6.7	11.1	14.8	15.3	10.6	4.9	0.8	-1.9
The total maximum daily rainfall: 17.01.1969 331.5 (kg/m ²)				Daily maximum wind speed: 22.01.1998 155.5 km/hour				Maximum Snow: 07.01.1993 5.0 cm				

A survey was conducted in the campus, with the aim of determining the preferences of the community. 384 questionnaires have been completed in a four-month period. Participants consist of students (n:216), academics (n:35), office workers (n:71), workers(n:25) and others (n:37). Preferences and positions of individuals, regarding bicycle use, were evaluated with a five-point rating scale.

Initially, questions regarding occupation, age and gender were answered by the participants, which followed by questions regarding their method of transportation. Survey consisted of sets of questions, which are mainly multiple choices, with an open ended question at the end. Six multiple choice questions related to the opinions of individuals regarding transportation systems and options, and also there were two Likert Scale questions. The second part of the survey was related to opinions of individuals regarding transportation options, and opinions of respondents. There was one open-ended question in the form. There was another question in the form of a rank list which was related to bicycle road routes and opinions of participants. Respondents were asked to rank each item on three-step rating scale from “important” to “unimportant”.

In the last part of the survey, respondents were asked to rank each item on five-step rating scale from “strongly agree” (5) to “strongly disagree” (1). The last part was related with the advantages and disadvantages of bicycles as a transportation option. Last section also included questions about the future expectations of participants regarding bicycles.

Participants were chosen at random. Most of the participants were pedestrians (35.2%), followed by private car owners (26%), and users of public transportation (21.6%). Majority of the total contributors were students (56.3%).

Acquired data has been evaluated using the SPSS 20 computer program with frequency analysis and chi-square tests.

3. RESULTS

3.1 Socio-Economic and Demographic Characteristics

Participants of the survey are; students (56.3%), workers (6.5%), office workers (18.5%), academics (9.1%) and others (9.6%). Male participants (62.0%) are greater in number than females (38.0%), and 86.9% of respondents had tertiary education (associate degree, undergraduate and postgraduate). Age grouping were as follows; 19-29: 76.3%, 30-49: 21.4% and 50-65: 2.3%. With regard to the individual monthly income, 50.2% earned less than 290€, 22.7% earned 291-514 €, 17.2% earned 515-685 €, 6.3% earned 686-857€ and 3.6% earned more than 858 € (Table 2).

Table 2. Socio-Economic and Demographic Characteristics of Participants

Variable	No.	No (%)
Gender		
Male	238	62
Female	146	38
Age		
19-29	293	76.3
30-49	82	21.4
50-65	9	2.3
Education Level		
Primary education	25	6.5
High school	25	6.5
University B.Sc.	267	69.5
University M.Sc./Ph.D.	67	17.4
Occupation		
Student	216	56.3
Workers	25	6.5
Office workers	71	18.5
Academics	35	9.1

Other	37	9.6
Monthly Income (€)		
Less than 290	193	50.2
291-514	87	22.7
515-685	66	17.2
686-857	24	6.3
More than 858	14	3.6

3.2 Participants' current method of transportation to get to the campus and their opinions of bicycles

39.9% of male participants get to the campus on foot, while 31.5% of female individuals prefer public transportation (bus and minibus). Current statistics show that only 1.4% of bicycle users are women, while 4.6% are men (Table 3).

Table 3. Gender specific distribution of transportation methods used to get to the campus

		How do you get to the campus?								
		Municipality bus	Motorcycle	Car	Minibus	Bicycle	Pedestrian	Other	Total	
Gender	Female	Number (N)	42	15	38	4	2	40	5	146
		Percentage (%)	28.8%	10.3%	26.0%	2.7%	1.4%	27.4%	3.4%	100.0%
	Male	Number (N)	41	15	62	10	11	95	4	238
		Percentage (%)	17.2%	6.3%	26.1%	4.2%	4.6%	39.9%	1.7%	100.0%
	Total	Number (N)	83	30	100	14	13	135	9	384
		Percentage (%)	21.6%	7.8%	26.0%	3.6%	3.4%	35.2%	2.3%	100.0%

X²: 15.968 df: 6 P: 0.014

Participant responses differed from the acquired current data, when asked which transportation method would be preferable, if all the required facilities were in place. Women mostly preferred buses (37.7%), while men preferred bicycles (31.5%) (Table 4).

Table 4. Distribution of preferred transportation method, in ideal conditions, according to gender

		Which type of transportation vehicle do you prefer to get to the campus?						
		Car	Motorcycle	Bus	Minibus	Bicycle	Total	
Gender	Female	Number (N)	48	2	55	18	23	146
		Percent (%)	32.9%	1.4%	37.7%	12.3%	15.8%	100.0%
Male	Male	Number (N)	60	21	55	27	75	238
		Percent (%)	25.2%	8.8%	23.1%	11.3%	31.5%	100.0%
Total	Total	Number (N)	108	23	110	45	98	384
		Percent (%)	28.2%	6.0%	28.6%	11.7%	25.5%	100.0%

χ^2 : 25.864 df:4 P: 0.0001

In accordance with the muscle power needed for bicycle use, distance of the route is a determining factor. Mostly, bicycle rides are travelled with an average speed of 10-15 km/h, and for 20-30 minutes on average (Uz and Karasahin, 2004). This has been considered a suitable distance for bicycle users.

When asked of the distance between campus and home, the ones who can reach their home under 30 minutes were 78.1% of partakers. 20.1% of the participants get to their homes in 30-60 minutes, while 1.8% in more than 60 minutes.

A statistical relationship was determined between the time spent while going home, and the future method of transportation preference. 51.7% of the people spending 1-15 minutes while going home declared that they will prefer riding a bicycle. Whereas, 20.7% of the people spending 16-30 minutes, 22.4% of the ones spending 31-45 minutes, 5.2% of the people spending 46-60 minutes and all of the people spending more than sixty minutes to get to their home declared they would not like to ride a bicycle as a method of transportation (Table 5).

Table 5. Preferred method of transportation according to the time spent

		How long does it take to campus from your home?					Total	
		0-15	16-30	31-45	46-60	60 <		
Which type of transportation vehicle do you prefer to get to the campus?	Car	Number (N)	64	50	11	3	1	129
		Percentage (%)	49.6%	38.8%	8.5%	2.3%	0.8%	100.0%
	Motorcycle	Number (N)	8	12	3	0	0	23
		Percentage (%)	34.8%	52.2%	13.0%	0.0%	0.0%	100.0%
	Bus	Number (N)	38	53	22	7	3	123
		Percentage (%)	30.9%	43.1%	17.9%	5.7%	2.4%	100.0%
	Minibus	Number (N)	16	17	13	2	3	51

	Percentage (%)	31.4%	33.3%	25.5%	3.9%	5.9%	100.0%
Bicycle	Number (N)	30	12	13	3	0	58
	Percentage (%)	51.7%	20.7%	22.4%	5.2%	0.0%	100.0%
Total	Number (N)	156	144	62	15	7	384
	Percentage (%)	40.6%	37.5%	16.1%	3.9%	1.8%	100.0%

X²: 34.725 df: 16 P: 0.004

3.3 Preferences of participants regarding bicycle roads

Participants stated that the most important aspect of a bicycle route is traffic safety (3.76 mean). The next important aspect, with a 3.65 mean, was parking options for bicycles, and the following, with a 3.63 mean, was the need for clean environment (Table 6).

Table 6. Importance of aspects of a bicycle road

	Level of importance				\bar{x}
	Unimportant (%)	Neutral (%)	Important (%)	Veryimportant (%)	
Visual diversity	13.3	9.9	38.0	38.8	3.02
Clean environment	2.1	5.2	20.1	72.7	3.63
Traffic safety	1.0	6.8	7.0	85.2	3.76
Users diversity	21.4	9.6	39.8	29.2	2.77
Infrastructure (toilets, fountains, benches, etc..)	12.5	8.9	35.7	43.0	3.09
Easiness of parking	2.3	6.3	15.9	75.5	3.65
Signalization	5.2	9.4	21.6	63.8	3.44
Proximity to recreational facilities	10.4	8.3	37.0	44.3	3.15
Driving facilities (Slope, width, etc..)	1.8	7.8	21.6	68.8	3.57
Proximity to home	4.4	7.6	29.2	58.9	3.43
Proximity to campus	6.0	6.5	26.8	60.7	3.42
Proximity to cinema and theater	28.1	8.9	39.1	24.0	2.59

\bar{x} Refers to arithmetical average

3.4 Participant opinions regarding bicycles

The sentence “compared to other transportation methods bicycle is environmentally safer” was voted highest with 2.79 average. Next sentence with the highest vote, with 2.72 average, “bicycle use is economically safer than other transportation methods”, next, with 2.71 average, sentences

“bicycle usage aids the prevention of noise pollution in the city”, and “new and designated bicycle roads would increase the number of bicycle users” (Table 7).

Table 7. Sentences presented to participants and their opinions

Suggestions	Agree (%)	Neutral (%)	Disagree (%)	\bar{x}
Transportation with bicycle is more comfortable than other transportation vehicles.	43.5	28.9	27.6	1.84
Current state of urban roads issuitable for travelling withbicycle.	71.9	11.2	16.9	1.45
Using bicycle is healthierthanothertransportation methods.	21.9	21.4	56.8	2.34
Bicycle use is safer for the environment than other transportation methods	8.1	4.2	87.8	2.79
Increasingbicycletransportationfacilitiesreduceexistingtraffic load.	11.5	14.1	74.5	2.63
Bicycle use is economically safer than other transportation methods	10.4	6.8	82.8	2.72
Bicycle rides are a way of socializing.	15.9	29.2	54.9	2.39
Bicycle usage aids the prevention of noise pollution in the city	9.9	9.4	80.7	2.71
Travelling to campus using a bicycle would promote bicycle use in the city	18.8	27.1	54.2	2.35
Riding bicycles makespeopletofeelfree.	21.9	25.8	52.3	2.31
New and designated bicycle roads would increase the number of bicycle users	9.4	9.9	80.7	2.71

\bar{x} Refers to arithmetical average.

4. CONCLUSIONS

According to the data acquired;

- In many cities climatic conditions limit the use of bicycles. Weather events, such as extreme temperatures, snow and rain, obstruct bicycle use (Uz and Karasahin, 2004). Thus, most users do not prefer riding under unfavorable conditions. Climatic conditions of Antalya are suitable for bicycle use during all four seasons.

- Topography of a city is another factor that obstruct bicycle use. Bicycle use depends on the physical condition of riders, consequently, topography of the land on which the bicycle route is placed, gains importance. Topography of the Konyaalti region is suitable for bicycle use in urban areas.
- Despite the fact that 78.1% of participants inhabit houses near enough for a comfortable bicycle ride, as the data shows, it is not a common preference. If the required facilities are provided, the use of bicycles for reaching to the Akdeniz University campus would increase from an average of 3.4%, to 25.5%.
- As a result of bicycles' need for little space, in the case of widespread bicycle use, there would be no traffic and parking problems within the city.
- Participants who are knowledgeable about the benefits of bicycle use, demand bicycle roads with traffic planning, sufficient bicycle parking facilities, signaling, suitable roads for easy riding and other similar elements to be provided according to world standards.
- Bicycle roads should be designed as an integrated transportation web, connected to each other and other means of transport, as well as Antalya's natural and cultural attractions.
- According to Uz and Karaşahin, in some societies bicycles are not used due to its sociological position, namely, that it is not seen as a respectable and suitable means of transport also are used by poorer classes and placed as a despised and non-preferred vehicle. Specifically in Turkey another major issue is traffic safety, where car and truck drivers do not perceive bicycles as vehicles. For a period of time, with the license implementation, bicycles were seen as vehicles in Turkey, whereas now, after abolishing the application, bicycles are not accepted as vehicles. Thus, riders do not receive the respect they deserve. Results of the research show that the presence of academic staff, personnel and students, who will prefer bicycle as a transportation device between Konyaalti and the campus, are significant.
- In our cities bicycle use is neglected, and transportation systems are designed only according to motor vehicles (Kalaycı et al., 2015; Lorasokkay and Ağırdir, 2011). Due to lack of traffic safety, which is a result of not building urban bicycle roads, very few people prefer bicycles. Thus, bicycle roads should be separated from motor vehicle traffic, and should be undivided, unless necessary.

- In both the city and campus, easy parking facilities, designed to provide ample and safe parking for bicycles, should be built.
- There is a need for raising awareness about bicycle use, with the aim of promoting bicycles. In this context, non-profit organizations, media organizations and other such societal activities are of great importance.
- Current legislature regarding bicycle use and roads, when compared to other countries, is gravely insufficient. In urban planning, traffic planning, politics and investments, bicycles should be taken into consideration and included to public agendas. Necessary legends for bicycle roads should be integrated into development plans; current laws and legislations should be renewed. Transportation plans should be prepared as a network of roads that include standard bicycle roads that are determined by Ministry of Environment and Urbanization. Additionally, bicycle and bicycle rider rights should be determined and improved within the legislature.

Developing the necessary infrastructure, raising the awareness of local administrations and public will increase the use of bicycles. As a result, deadly motor crashes will be prevented, traffic jams will be less frequent, both noise and air pollution's negative effects will decrease and cities will become more habitable and accessible.

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