

# ANALYSING TRAFFIC ELEMENTS IN INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA BY REVEALED PREFERENCE APPROACH

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## ABSTRACT

University campuses should create peaceful and pleasant learning environment for the benefits of campus community. The degree of transport use on-campus by both staff and student population is very important to achieve this noble target. It has been observed in the recent past that the alarming vehicle growth in the University would eventually not only exert tremendous pressure on the road and other traffic related infrastructure but also induce detrimental effects on learning environment. The purpose of this paper is to highlight the perceptions of IIUM community on existing traffic elements conditions including parking and bicycle use in IIUM Gombak campus. Questionnaire survey was administered targeting academic, administrative and student population on-campus. About 389 (33%) filled-in questionnaires were collected from staffs and 775 (67%) from students. The findings on the perceptions of IIUM community on traffic elements conditions in IIUM including parking provisions, pedestrian circulation system and bicycle use are highlighted in this paper. Discussion on issues related to traffic flow on-campus and conclusions are also drawn.

**Keywords:** University Campus, Parking, Bicycle Use, Pedestrian Circulation System, Traffic Flow

## 1. INTRODUCTION

Traffic flow characteristics are one of the important physical components in a University setting. Transport provides mobility for University community especially staff and students both internally within campus and from internal to external and vice versa as well. Planning of transport infrastructure to facilitate movement of people on-campus is very imperative to ensure adequate supply to meet demand and achieve conducive learning environment. However, transport infrastructure on-campus at many occasions need to be planned within limited land spaces and other related resources. One of the main functions, amongst others, of University campuses is to provide peaceful, harmonious, healthier and safer learning environment. To achieve this function, the impact of traffic circulation and other related traffic and transport components on unhealthy and unsafe learning environment should be minimal. The increasing private vehicle growth on-campus over the years and the associated transport infrastructure requirements especially parking provision has been found to threaten the accomplishment of safe and healthy learning environment. There is no sign of

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abatement on private vehicle growth at many public and private Universities. The increasing private vehicle growth on-campus has exerted enormous pressure on the transport infrastructure because of limited land and other resources.

This paper addresses the existing conditions of traffic elements at International Islamic University Malaysia, Gombak campus. Questionnaire survey was administered targeting academic and administrative staff and student population in IIUM Gombak campus. The findings on the perceptions of users, the campus community, on the existing conditions of traffic elements including parking provisions, pedestrian and bicycle infrastructure from the questionnaire survey are highlighted in this paper. Discussion on issues related to existing traffic elements and conclusions are also drawn in this paper.

## **2. STUDY APPROACH**

A study was initiated to evaluate the existing traffic flow characteristics in IIUM Gombak campus because of the increasing use of motorcars and the associated parking demand on-campus. The study focuses on traffic elements such as road geometrics, road intersection, traffic flow, parking supply and demand, and pedestrian circulation system. Data on each of the selected traffic elements were collected by using inventory survey, field measurement survey and observational survey. Data were also collected on the number of staff and student population, and number of registered vehicles by staff and students on-campus from the relevant authorities in IIUM. A questionnaire was prepared covering the conditions of traffic elements such as parking availability, pedestrian circulation system and the use of bicycles on-campus. Questionnaires were distributed to all Kulliyahs on-campus targeting staff and student population, to ascertain their perceptions on the existing conditions of traffic elements. About 389 questionnaires were collected from academic and administrative staff and 775 from students. However, this paper focuses only on the findings related to perceptions of IIUM community on traffic elements from the analysis of questionnaires.

## **3. GENERAL CHARACTERISTICS OF IIUM GOMBAK CAMPUS**

The main campus of International Islamic University Malaysia is located at Gombak, within 10 km at northeast of Kuala Lumpur city centre. The main campus covers an area of 710 acres. It houses Kulliyahs (faculty) related to Architecture and Environmental Design (Built Environment), Engineering, Information and Communication Technology, Economics, Islamic Revealed Knowledge and Human Sciences, Law and Education. The total number of student population including undergraduates and postgraduates at the main campus was about 16,500 in the year 2007 and increasing (CBE, 2007). The projected total student population in 2015 will be about 23000 (CBE, 2007). The total number of academic staff and administrative staff at the main campus were about 1400 and 1200 respectively in the year 2007 and increasing (CBE, 2007). The projected total number of staff in the year 2015 will be

about 3400 (CBE, 2007). The increasing number of the campus population has been exerting enormous pressure on physical infrastructure including road and related transport infrastructure on-campus. The other campuses of IIUM are located at Kuantan, Damansara, Petaling Jaya and Nilai.

#### 4. TRAFFIC FLOW CHARACTERISTICS

This section highlights the existing traffic flow characteristics in IIUM Gombak campus. The road network on-campus comprises both major road (in the form of circular road) and secondary road mainly connecting to Kulliyyahs and Mahallahs. The major circular road is a 2.5 km single carriageway with two traffic lanes measuring width of 3.65 m each with 1m pedestrian walkway and 1m landscape area. The traffic flow along the major circular road is a one-way movement system. The average traffic volume entering the campus over a period of 10 hours was measured at 840 vehicles per hour with a high peak, about 1077 vehicles from 9-10 in the morning, about 959 vehicles from 2-3 p.m. in the late afternoon and about 1005 vehicles from 5-6 p.m. in the evening. The total number of vehicles leaving the campus in the evening was measured at about 1060 vehicles in the evening hours (5-6 p.m.). Expectedly, the number of motorcars was recorded the highest, about 60-70%, followed by motorcycle, about 15-40% which indicated the common types of transport used by the campus population.

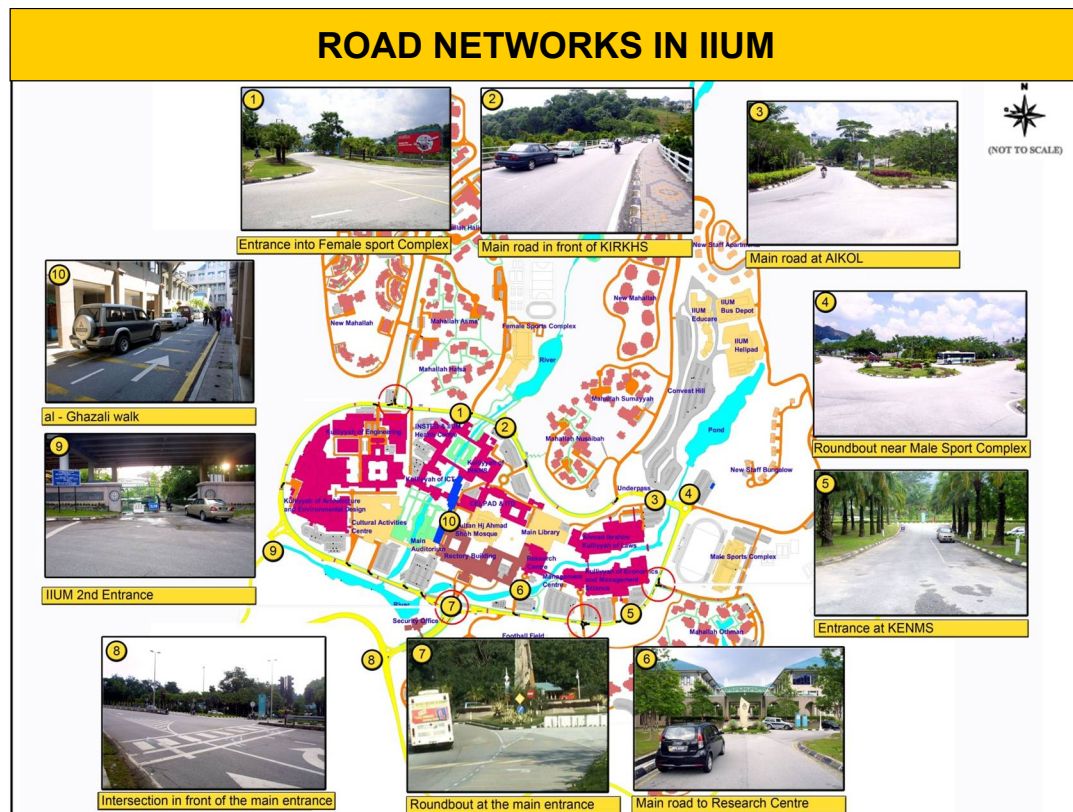


Figure 1 Major Circular Road Network in IIUM Gombak Campus  
 Source: Draft Final Technical Report, CBE, 2007

Car parking is another important traffic components affecting traffic flow conditions on-campus. Increasing parking demand within limited parking supply allowing vehicles to park at locations other than designated parking area is the major reason for this trend. Looking at the parking supply and number of staff on-campus, the parking ratio at the most of the Kulliyahs was measured at one parking space to two or three staff members of the Kulliyahs. This scenario clearly showed that there exists lack of parking spaces on-campus for staff members of the Kulliyah, as most of the staff members (more than 80% of total staff population) commute to campus by motorcars. The pressure on existing parking spaces is much higher, if the number of students (about 20% of the student population) who commute to campus by motorcars is taken into account. This scenario, eventually, leads students, especially, to park at the kerb side of the road in the parking area, thereby obstructing the vehicles parked at the designated parking spaces whenever the vehicle is required to leave the parking spaces.

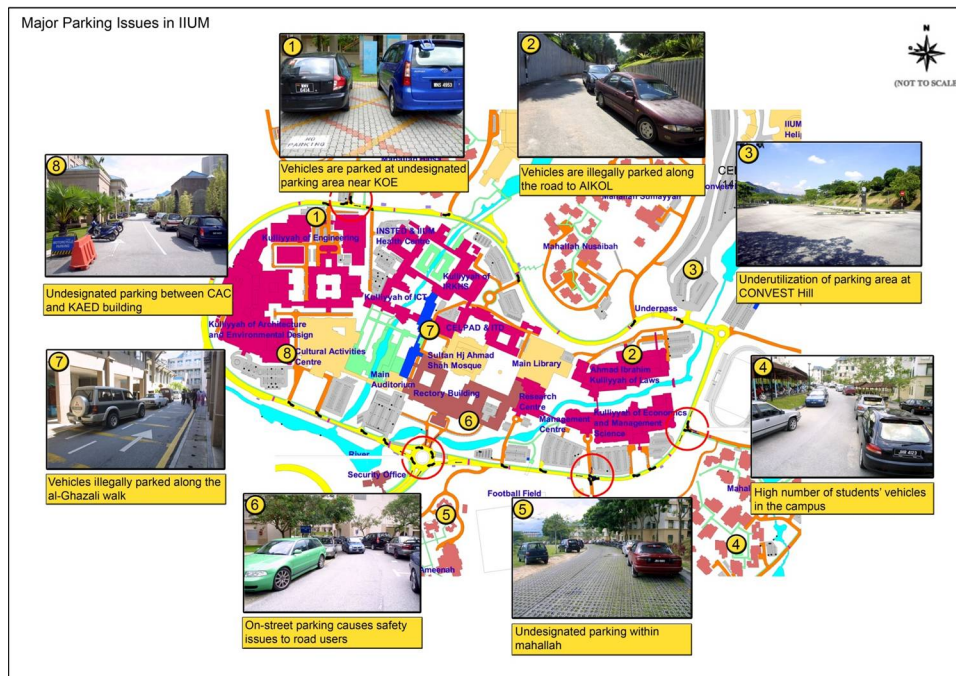


Figure 5 Major Parking Issues at IIUM Gombak Campus  
 Source: Draft Final Technical Report, CBE, 2007

The analysis on parking showed that parking demand exceeds parking supply at almost all Kulliyahs (faculties) on-campus. The average parking occupancy at some of the Kulliyahs was found to be reaching close to 100% indicating high parking demand. At other Kulliyahs, the average parking occupancy was found to be between 75% and 95% of the available parking spaces and at times, especially in the morning and late afternoon, reaching close to 100%. Overall, the analysis on parking showed that there exists undersupply of parking due to high parking demand. To exacerbate the parking situation further, the number of motorcars registered on-campus has been increasing steadily.

## **5. PERCEPTIONS OF IIUM COMMUNITY ON THE CONDITIONS OF TRAFFIC ELEMENTS**

This section discusses on the perceptions of IIUM community, staff and students, on aspects related to the conditions of traffic elements.

### **5.1. Basic characteristics of the respondents**

#### **5.1.1. Staff**

Among the staff members who responded to the questionnaire, about 26.5% constitute academic staff and the remaining 73.5% administrative staff. The respondents from the IIUM library constituted the highest (about 24%) followed by the main administrative office (about 23%). A very high percentage of the staff members (86%) were driving their own private cars to the campus for work purposes. From the total number of respondents who were driving their own vehicles to campus, 29% were academic and the remaining 71% administrative staff. About 19% of the staff responded that they have a reserved parking space in their respective parking areas at the department/Kulliyyah.

#### **5.1.2. Student**

Questionnaires were also distributed to student population at large. A total number of 775 students responded to the questionnaire distributed. Among the student respondents, about 82% were undergraduate students and the remaining 18% were postgraduates. The highest percentage of students was from Kulliyyah of IRKHS, about 32% followed by Kulliyyah of Law (about 17%). Nearly 12% of the students were staying off-campus. The travel profile of the students revealed about 15% of the students staying on and off-campus was driving car, 21% driving motorcycle, 49% walking and only 1% was using bicycles.

### **5.2. Perceptions of staff on the conditions of traffic elements**

The staffs were asked to provide their views on parking provisions, pedestrian connection and traffic flow on-campus. About 42% of the staff had expressed that finding a parking space at their respective parking area in the department is a problem. About 24% of the staff, attached to the library, had expressed that parking space availability is highly unlikely followed by 20% in the main administrative office and 16% in the Kulliyyah of IRKHS. The reason for this trend is due to high parking demand but limited parking supply. In most of the Kulliyyahs, the parking spaces are shared between staff and students. The increasing number of students driving their own cars is another reason for increasing parking demand in the Kulliyyah. Limited land

availability and other resources are adding further constraints in expanding the parking supply.

Pedestrian connection between Kulliyyahs and other areas on-campus is imperative to encourage walking among the IIUM community. With the increasing number of private vehicle use on-campus, provision of covered walkway or walkway supported with shaded landscape together with continuous walkway path is highly important. It would encourage users to walk within campus at least, thus reducing the use of private vehicles. It would further assist in to strengthen social integration and interaction among IIUM community. A high number of respondents (about 74%) had expressed that the campus has a continuous and well connected pedestrian network. However, about 18% of the staff had expressed that the pedestrian connection on-campus was not well connected.

With the increasing number of private cars used by IIUM community and the associated traffic flow issues, the University management had implemented the major circular road from two-way into one-way traffic movement few years ago. At the initial stages of the implementation, it draws confusions and displeasure among the IIUM users. However, as time progresses, users have been getting use to the one-way traffic circulation system. It also helps to smoothen the traffic flow conditions with enhanced safety. The question on the agreement on the one-way traffic circulation system, more than 50% of the staff agreed to the system. However, about 34% of the staff disagreed as a result of long traveling distance both within campus and from campus facility to the entrance/exit gate of the University. This percentage of disagreement is expected to be reduced as and when the users are getting used to the one-way traffic circulation system over the time period.

### 5.3. Perceptions of students on the conditions of traffic elements

The findings on the perceptions of students on parking provisions, bicycle use, walking and one-way traffic system are highlighted in this section. Car parking demand has been increasing as the result of appreciable number of students driving into campus. The increasing number of car use by the students on-campus cannot even meet the Town and Country planning department's requirements on parking standards which state 1 parking space to 40 registered students (TCPD, 2002). About 15% of the students were driving their own car into the campus. This has generated a high parking demand in many Kulliyyahs. However, the parking supply is very much limited in the Kulliyyah which, eventually, allow students to park at the undesignated locations at the parking area. A question on the parking availability at the respective Kulliyyahs by the students revealed nearly 60% of the students had expressed parking is either "not at all available" or "infrequently available". To overcome increasing parking demand by the students, the University has earmarked a huge parking area (called Convest Hill) on-campus consisting of 788 car parking spaces. However, a high proportion of students (nearly 74%) were unwilling to park their cars at this location. This is especially due to the locations of this parking area which is far from most of the Kulliyyahs. The parking demand is expected to increase further in the near future as a result of increasing

number of student population and number of car use, thus creating more parking problems, unless the University authority takes drastic measures to help cushion this effect. About 21% of students were found to use “motorcycle” as a mode of transport within campus.

Use of bicycle on-campus should be promoted to help reduce the parking demand and also to achieve healthy lifestyle. However, a very low percentage of students (about 1%) were found to use bicycle as a mode of transport within campus. On the willingness to use bicycle on-campus, about 46% of students were willing to use “occasionally” and 34% “not at all”. “Extreme weather conditions (33%)”, “mixed traffic conditions (18%)”, “no bicycle lane provided (17%)” “inconveniences of one-way traffic circulation system (14%)” “long travel distance between some of the Mahallahs and Kulliyahs (11%)” were among the top reasons, as cited by the students, for not willing to use bicycle on-campus.

Walking is another mode of transport used by students to reach various places within the University. Almost 50% of the students said that they were walking to reach locations within campus. The survey has also found that nearly 73% of students were willing to walk to reach places on-campus. Good pedestrian connectivity within campus is one of the main reasons for this trend. Moreover, the University was planned with the aim to achieve “a walking campus” thus encouraging students and staff alike to walk within campus. Additionally, it would also reduce the use of cars and thus reducing the parking demand and benefiting the environment.

On the one-way traffic circulation system along the major circular road on-campus, majority of the students (nearly 67%) agreed with the system.

## **6. DISCUSSION**

The learning environment in University campuses is very important and crucial to promote effective learning and research skills and knowledge among the University community. On the other hand, the provision of transport and other related infrastructure on-campus are also important to fulfill travel needs of the University community. The transport infrastructure should provide supportive role to the learning environment of the campus without contributing to congestion, accidents and pollutions. The policy on motorcar use on-campus should regulate the number of motorcars which could enter into the campus, thereby reducing the negative impact of vehicle use on-campus. However, in many University campuses in Malaysia, including IIUM, the number of registered motorcars has been increasing steadily over the years. (Abdul Azeez, 2011). This has resulted in exerting enormous pressure on the limited transport and related infrastructure on-campus. Congestion at certain period of the day, haphazard parking at locations leading to accidents and loss of road capacity, air pollutions are the common variants which could be seen in many University campuses. These negative effects are the detrimental aspects of learning and research environment of University campuses (Abdul Azeez, 2011).

Walking and cycling are effective and perfect mode of transport on-campus, but not commonly practiced in University campuses including IIUM. With limited land space, financial and other related resources, walking and cycling could be seen as not only energy efficient and healthy transport modes but also effective and economic utilization of land and other resources. The responses from the questionnaire survey administered among student population on-campus in IIUM showed that nearly 50% of the student population stated “walking” as mode of transport from one activity to another activity on-campus. This finding was found to be in contrast with number of students stated “cycling” as major mode of transport to travel within campus. Surprisingly, nearly 1% of the student respondents stated that they travel by using “bicycle” from one activity to another within IIUM campus (Abdul Azeez, 2011). Some of the contributing factors toward low level of “bicycle” use in IIUM, as expressed by students, were unlevelled road stretches along major circular road, no clear segregation of motor vehicles and bicycle movement, bicycle parking spaces, and security concern against the theft of bicycles. Effective measures in terms of improved facilities (bicycle lane, covered walkway) and policies in controlling the use of motorized vehicles on-campus would encourage the use of ‘bicycle’ and ‘walking’ among the student population.

In the short-term, the proposal to expand parking supply, though, appears to be an attractive measure to meet the increasing parking demand, however, it looks less apparent to implement because of the limitations in land, financial and other related resources. Additionally, this measure could only meet the parking demand in the short-term, however, as number of motorcar’s use increases further, it increases additional pressure to create more parking capacity and the process continues. Careful planning in terms of managing existing physical road and other related resources is highly required to handle traffic growth on-campus. Providing regular bus services between Mahallahs and Kulliyyahs, Mahallahs and administrative offices, and between Kulliyyahs could be another effective measure which would greatly reduce the use of motorcar and thus, addressing high parking demand within IIUM campus. Promotion of green environment through the use of walking, bicycle and bus services on-campus, thus, creating conducive and competitive learning and research culture should be highly advocated and realized (Abdul Azeez, 2011).

## **7. CONCLUSIONS**

Creating a pleasant and healthy learning and research environment in a University setting is very important and vital to enhance not only knowledge and skills related to teaching and research but also physical image of the campus. Transport infrastructure is an important infrastructural requirement to fulfill the mobility and accessibility needs of University community. Importantly, the provision of transport infrastructure should provide a smooth, convenient, and safe movement of vehicles and pedestrian on-campus. This paper has addressed the perceptions of IIUM community on existing traffic elements including parking provisions, bicycle use, pedestrian and traffic circulation system. The demand for parking and other traffic related components has



been rising due to increasing use of motorcars and motorcycles and at reached close to 100% parking supply. This has resulted in haphazard parking of vehicles causing obstruction to traffic flow and accidents. The increasing use of motorcars on-campus has affected air quality level, and involvement of frequent accidents. This trend would continue to accelerate further in the near future if no remedial measures are taken.

The survey has showed that use of bicycle among student population, was at low level. The bicycle use on-campus would be enhanced if supporting infrastructure such as bicycle lane, parking spaces for bicycle and security arrangement against bicycle theft is in place. Additionally, operation of regular bus services within campus would not only help decrease use of motorcars, thus reducing parking demand and road infrastructure but also, more importantly, promote green environment which is very much required and essential for a pleasant and healthy learning and research culture.

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