Transportation behaviours and challenges of non-resident students at a South African university

Adrien ILumbe Laby, Subisiso Shabalala, Boitwarelo Molokwane & Juanita Vander Walt
Department of Transport & Supply Chain
University of Johannesburg
South Africa
labyilumbe@gmail.com, labyi@uj.ac.za

Abstract

South Africa has seen a substantial rise in the number of students enrolling in higher institutions as a matter of fact these students need transportation to access universities activities. The main purpose of this study was to determine the effect of transportation related challenges of non-resident students, from the Auckland Park Bunting Road (APB) campus at the University of Johannesburg to their place of residence and vice versa. To comprehend transportation related challenges, the objectives focused on analysing the choice of transport mode, distances and duration of trips, transportation cost and specific transportation challenges students experience. Using a survey questionnaire, data were collected from 309 non-resident students at APB campus. Around a third of respondents (34%) indicated to reside in suburbs neighbouring the APB campus. The findings indicated that transportation challenges affected about 75% of non-resident student's attendance and participative energy in class. Less than a third of respondents (29%) indicated that the ideal mode of transport is the free inter-campus bus as part of their transportation networks. Surprisingly, none of students cycle to access this university. On time transportation service, safety, availability, cost and comfort are some of the essential challenges experienced as some of academic programs are scheduled early morning or evening.

Keywords
Transportation Challenges; Non-Resident Students; Mode Of Transportation

1. Introduction
Since the early 1990s, South Africa has seen a significant increase in the number of students enrolled in higher education institutions (Council of Higher Education, 2016). In this same context, the University of Johannesburg (UJ) has experienced rapid growth, by 2017 a total of 50, 429 students had enrolled for under-graduate and post-graduate degrees (UJ HEMIS, 2018). Enrolled students include both local and international students studying at the institution, although some students are expected to reside on campus, while others remain non-resident. As seen across the globe, universities continue to take a more principal role in equipping, educating and trains the new generations of engineers, economist, managers, politicians, and other professionals with the skills and principles needed to implement a circular economy (Bonnett, 2012; de la Torre, Onggo, Corlu, Nogal & Juan, 2021). As a matter of fact, there is a limited accommodation capacity for all students to reside on campus. Therefore, all non-resident students are forced to make use of any mode of transport to access higher education and attend lectures. The term non-resident student is used to describe a student who lives away from campus also known as off-campus students. For example, in 2018, as many as 36 372 undergraduate students and 7 274 post-graduate students were non-resident students (86%). All these latter students are responsible for their accommodations and own transportation to and from the university campuses because the university does not have the necessary funds to provide transport from all the different locations where students are residing to the campuses (UJ HEMIS, 2018). As matter of fact, UJ transportation network services are very limited network to campuses destination without any deviations. Arriving on time and safely at campus and returning home or to places of residence can be challenging. Kasayira, Chimpandambira and Hungwe (2007) found that transportation is part of the seven most common stressors university students in neighbouring Zimbabwe face beside finance, library resources and study material, accommodation, food, inadequate and lecturer related problems. If not addressed, the problem will expand and non-resident students will develop a complete evasion behaviour, which will manifest itself

more visibly in the form of skipping lectures and frequent absences. This can have a negative impact on students' grades, university life exposure, social interaction and young adults stage life.

For the past years, the degree success rate of non-resident students has been lower than those of resident students. According to Mudau (2017: 10571) it is debatable if no-resident students are entirely committed to their education. It is precisely in this context that certain challenging factors related to transportation reduce non-resident commitment to their studies. Mudua (2017: 10574) admitted long travelling distances results of being late for early classes as students arrive at university exhausted and unable to focus on their academic tasks and also hardly use the library. In addition, non-resident students unable to attend late classes (evening) due to anxiety of being robbed on their way back to their place of residences. In 2018, the degree success of rate for UJ resident students was 93.5%, for non-resident students was 87.8% (UJ HEMIS, 2018). A possible reason for this discrepancy could be related to class attendance that could be exacerbated by transport to and from campus, which will be the focus of this research. Whereas on-campus students are classified as resident students, the hostels or the property of the resident students are owned and managed by UJ. On the other hands, non-resident students refer as place of residence outside university's premises have a high susceptibility to outside influences that may disrupt their academic progress such as isolation. Timmons (2014) stated that a sense of detachment exists on non-resident students with their university. Mudua (2017: 10571) admitted that some academic lectures are scheduled weekends, early morning and late evenings. Additionally, such lecturing period are disadvantageous for non-resident students, who will have to adjust their transportation schedules.

The Auckland Park Bunting Road (APB) campus is one of the four urban campuses of UJ, it is a home of Faculty of Art, Design and Architecture, some departments in school of management and the top school of tourism & hospitality on the African continent. Students from the other three campuses have access to the APB campus, namely Auckland Park Kingsway campus (APK) (2.5 km from APB), Doornfontein Campus (DFC) (7 km from APB) and Soweto Campus (SWC) (20 km from APB) via the inter-campus student bus system or by public and private transport. The APB campus can easily be accessed by any of the three modes of public transport that link all four campuses, namely, Metrobus, Putco bus and the Rea Vaya Bus Rapid Transport (BRT) system. In addition, the students can choose other modes of transport that service these campuses, such as minibus taxis, metered taxis, Tuk-Tuks, and Uber. Alternatively, students may choose to walk, cycle, or use a motorbike. Deciding on the mode of transport could be determined by several factors, such as availability, time, cost, security, convenience and comfort. Studies conducted in South Africa found that comfort is the most preferred attribute for any transport user (Dell'Olio, Ibeas & Cecin, 2011). It was further found that a sense of security and cleanliness are important factors that determine travel choice characteristics for women (Yavuz & Welch, 2010). Generally, the users of public transport value reliability, shorter waiting time and comfort as their top priorities (Cantwell, Caulfield & O'Mahoney, 2009).

In 2013, Mbara and Celliers studied the 'Travel patterns and challenges experienced by University of Johannesburg off-campus students. Their quantitative research established the origin (residential location) of students, compared the differences between campuses as it relates to mode of transport used, determined the number of transport modes used, travelling and waiting times, and travel costs. Through qualitative focus group discussions some travel challenges were identified but not quantified. One recommendation was that in view of the expressed need by some students to cycle to campus, Johannesburg City should provide infrastructure that is conducive to safe cycling. At the time of their study the Rea Vaya Bus Rapid Transit (BRT) system had not yet been launched, neither were there any bicycle lanes in Johannesburg. Subsequently, the City of Johannesburg (2014) encouraged both public and private transport users to utilise alternative modes of transport, such as walking and cycling to decrease gas emissions and traffic congestion arising from the use of private vehicles. In 2015, the Johannesburg Development Agency (JDA, 2015) earmarked R120 million to create cycle lanes connecting the University of Johannesburg with Park Station. At the time of this survey these lanes had been completed, however it did not seem to have created a commuter cycling culture. The new city council which took office early in 2016, decided to discontinue the bicycle lane development (Morgen, 2017). In October 2013 (Sandton Chronicle, 2013), the Rea Vaya route linking Park station to the University of Johannesburg, extending to Dobsonville, was opened, offering students an additional public transport option to reach APB.

According to Mbara and Celliers (2013) students at the APB campus originate predominantly from the Johannesburg Central Business District and suburbs neighbouring the APB campus, followed by Soweto, West Rand, East Rand, and the Central and Northern Suburbs, as illustrated in Figure 1. Thus, the students are likely to use various modes of

transport and have a range of experiences in health benefits for non-motorised students and building significant social connections in public systems users.
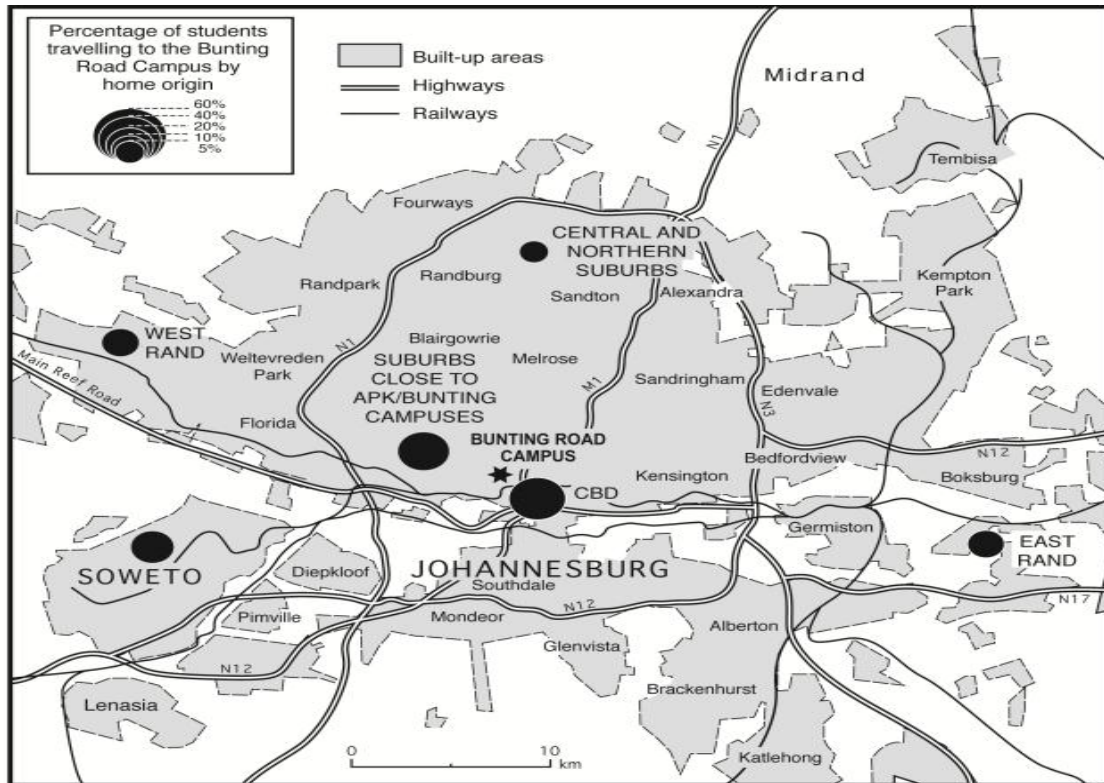

Figure 1: Origin of Auckland Park Bunting Road Campus students.
Source: Mbara and Celliers (2013:4)

Since 2013, the number of non-resident students at APB has increased, an additional mode of transport, the Rea Vaya BRT system has been operating past the campus from DFC to SWC via both APB and APK, additionally bike lanes for cycling have been completed all the way from DFC past APB to APK. Yet, students continue to arrive late at class and leave early. This research determines to what extent these additional modes of transport as well as the free UJ inter-campus bus service between all four campuses (which was not included in the previous study), are utilised by APB students. UJ is in charge of coordinating the free bus services for all its students enrolled at any campuses, this kind of reduce lower the transportation cost on non-resident students' shoulder. In addition, the relevance and seriousness of problems experienced by non-residents when travelling relating to time, safety, availability, cost and comfort are explored. Whereas the Mbara and Celliers (2013) study only included second year students, this study included students from different academic years.

1.1 Research problem statement
About 86% of the students at UJ are non-resident students that make use of all types and modes transport, from public to private in order to access higher education and attending lectures. For the past four years the degree success rate of the UJ non-resident students have been lower than the rates for resident students. Indeed, transportation challenges of these non-resident students experience to access APB campus have not been investigated. If remains unchecked the problem will expand and create habitual absenteeism or transportation anxiety. As a result, these non-resident students are more likely to experience difficulties in adjusting and planning their transportation networks and become disinterest in attending lectures and some students become selective on their timetables to escape faced daily transportation challenges.

1.2 Objectives
The main purpose of this study was to identify the main mode of transport used by non-residents students and to determine the effect of transportation related challenges on the attendance of lectures at the APB campus. To

comprehend transportation related challenges the objectives focused on analysing the choice of transport mode, distances and duration of trips, transportation cost and specific transportation related challenges experiences.

2. Literature Review

Students at APB have an opportunity to secure residence outside the campus in neighbouring areas, such as Auckland Park, Melville, Braamfontein, Parktown, Newtown, Brixton and Westdene. These areas are a few meters to kilometres away from the campus and offer non-motorised transport as a viable mode at lower cost and less complex. In such instance, distances are shorter, and it is easier to access various events as they live and work in the same community (Hjorthol, 2016; Hjorthol & Bjrnskau, 2005). Whereas students residing in suburbs such as Boksburg, Katlehong, Sebokeng, Orange Farm, Soweto, Alberton and Kempton Park, require a complex transportation mode mix to reach campus in order to attend lectures. Rogans (2006) and Behrens (2004) observed that much of the literature on learner transport in South Africa has focused on primary and secondary school children and not on university students. In this context, it is critical to diagnosis university student's transportation challenges to access higher education as a non-resident student. Due to the fact there is a change in transportation behaviour according to Paepe, De Vos, Van Acker and Witlox (2018:477) as students' progress from secondary to higher education institutions. According to Muslim, Karim, and Abdullah (2012:876) the rapid growth experienced in higher educational institutions required universities to be well equipped with conducive student accommodation in order to improve students' well-being. Much focus had been on providing student accommodation for on-campus, while non-residents lifestyle had been overlooked. It is in same context that Malaysian universities have increased in their responsiveness, contribution and commitment towards better services and quality education for all students.

2.1 Non-motorised mode (Walking and cycling)

Students living in the surrounding neighbourhoods near APB have the option of walking to and from campus. According to Kaplan (2015:179) there's still the misconception that walking takes longer and also the weather has arisen as a major factor preventing students from walking and cycling. However, some universities lectures are scheduled in the evening, therefore non-resident students are faced with challenges, such as theft, assault, crime and rape. Every return trip that is taken from the institution to their places of residence is coupled with anxiety and a lack of safety and security to the extent that students will perceive that absconding lectures is the most suitable option, especially if there are financial constraints that hinder the individual to utilise an alternate transportation mode (Sabean, 2007). Regardless of streets light and security presence at the entrance campus areas, students still feel unsafe due high crime in last year's students were robbed around a Braamfontein bus stop situated in UJ bus network for a free charges to all its students and employees.

The city of Johannesburg (2014) has constructed cycling lanes in and around Johannesburg to encourage greater use of cycling as a transport mode. 'Bike lanes' run between some of the campuses; from APK to APB to DFC. As three of the four campuses of UJ are situated in, and around, the Central Business District (CBD) area, it also intends to cater for Parktown, Braamfontein, Hillbrow, Brixton and Melville commuters as shown in Figure 2.
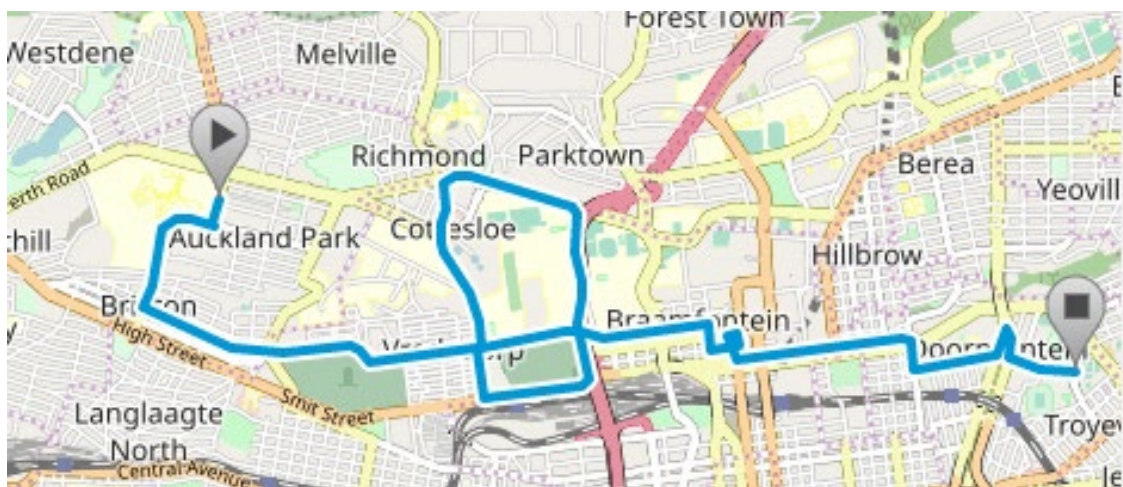

Figure 2: University corridor cycling lanes.
Source: bikemap.net (viewed 10 April 2020)

Students can choose this mode of transport as a simpler and more viable option. Challenges with this mode of transport include accessibility and security while the advantages include improving exercising of healthy body while travelling from place of residence to university in order to access education.

2.2 Private automobile mode

Many young adults use car less often in favour of public transport, cycling, and walking (Goodwin, 2012; Hjorthol & Bjørnskau, 2005; Kuhnimhof et al., 2012a; Kuhnimhof, Buehler, Wirtz, & Kalin owska,2012b). Berrington and Mikolai (2014) add that young adult living in the parental home are also less likely to drive (despite having a driver's license). This favours the use of public transport since it is forbidden to use a mobile phone while driving (Berrington & Mikolai, 2014). Student's transport cost can be measured by the cash spent on commuting to class (DoE Survey, 2003). Thus, a crucial factor to consider before exploring the various transportation modes is cost.

This mode of transport constitutes private motor vehicles and motorbikes. Students either drive their own vehicles to and from APB, or are transported by their family members, relatives or friends. The advantage of this mode of transport is that it is convenient, safe, comfortable and reliable. The challenge is that it could be costly, in particular with the rise in the fuel price. A limited number of students have access to this mode of transport. Another explanation may be that young adults consider owning a vehicle to be prohibitively costly due to rising insurance, driver's license, petrole, repairs, and tax costs (Latinopoulos, Le Vine, Jones, Polak, 2013; Le Vine, Polak, & Kuhnimhof, 2013; Noble, 2005; Office for National Statistics, 2013). However, other evidence indicates that young adults are not necessarily more environmentally aware or less car-oriented than previous generations (Delbosc & Currie, 2014b; Le Vine, Jones, Lee-Gosselin, & Polak, 2014; Van Acker, 2017).

However, a new system of private automobile transportation named "Uber" together with its competitor "Bolt/Taxify" have been introduced to request a private car trip to the doorstep. This system has replaced the traditional metered taxis. A meter-taxi is a form of transport where a passenger calls and hires the vehicle to a specific place, however the regulation of taxi fares can take various forms of maximum, minimum or a fixed charge per kilometre and may also depend on the time or distance travelled (Ndlovu, no date). In 2013, Uber was launched in Johannesburg, Cape Town and Durban and by 2014, it had reached over 1 million safe trips (PMG, n.d.). According to the Parliamentary Monitoring Group (2015), Uber and Taxify are the most reliable and complementary travel modes of transport. This new system reduces the need for owning a private automobile. As it is costly to purchase and expensive to maintain an ownership automobile. Therefore, this smartphone transportation system becomes an affordable option to gain the benefit of private car ride such as comfort and freedom to not be bound to any restricted driving regulations.

2.3 Taxis, mini-bus taxis, bus and tuk-tuks

The mini-bus taxi industry is the biggest form of public transportation that serves South Africans in and around the country (Nkambule & Govender, 2014). Breakdowns, indiscipline taxis drivers and safety are huge problems for this transport mode, owing to vehicles being serviced on a reactional basis. In such cases, students are exposed to fatal crashes. Additionally, Govender and Allopi (2007:165) points out that Taxis – mini-bus taxis are more frequently involved in road traffic accidents than other types of modes. In comparison to other modes of transportation, the minibus taxi is quicker, more efficient, stopped conveniently near to commuters' destinations, and relatively inexpensive (Nkambule & Govender, 2014). APB non-resident students have access to the Gautrain bus, Rea Vaya BRT system, Metrobus and Putco bus. Challenges include overload during peak periods of the day and some unreliability pickup times. In Johannesburg, Tuk-tuk is a relatively new mode of transport introduced as a result of curbing the challenges of theft and robberies around the suburb areas of Johannesburg, especially for students of UJ and the University of Witwatersrand (Mbara, 2016). A Tuk-Tuk is a three-wheel mode of transport that is affordable and accessible (Mbara, 2016).

2.4 Railways transportation mode

There are two types of rail transport options that students can utilise, namely Metrorail and Gautrain. Rail is the most cost-effective mode in comparison to all commuter transit modes, and in comparison, it has the highest number of challenges. The Park station terminal is situated approximately a kilometre from APB (Broll, 2011), the main weakness with this railway's mode is limited from terminals to terminals therefore leads students to substantiate an additional mode to reach University or place of residence.

The biggest challenge of rail is that it is inflexible, and during peak hours is often overloaded by passengers (Royal Academy of Engineering, 2015 & Maluleke, 2013). This results in passengers having to stand during their trips. Other challenges include crime and unreliability in metrorail. The inflexibility of this mode results in students having to change their modes of transport when travelling to and from the campus (Maluleke, 2013).

2.5 Impact of transport delays on students' performance

Attendance of lectures should be a priority of students, owing to the fact that it ensures a progressive learning environment. Attending university on a regular basis is a critical factor in educational success (Mugoro, 2014). Joseph and Olatunde (2010) found that although students would prefer a shorter travelling distance to access an education, some students travel long distances to access universities. The authors observed that some students tend to miss their first or early lectures of the day and leave afternoon or evening classes owing to transportation availability. The Student Welfare Directorate (2010) stated that students who regularly attended to academic classes are more likely to obtain higher grades as compared to those who are frequently absent from university. Absenteeism creates a loss in opportunity to ask questions where a student may not understand and ultimately fail to equip themselves with the skills and knowledge required to elevate to the next phase of their academic progress (SWD, 2010). However, this can not the only reason, but it is the only bridge that stands between place of residences and Universities.

3. Methods & Data Collection

An explanatory quantitative survey was conducted among non-resident students at the APB UJ campus. A structured questionnaire was distributed on campus to 350 non-residents students and anonymously completed. Out of these 309 could be used and were analysed using the IBM SPSS statistics 24 version (statistical software program) while the rest of questionnaires were disregarded as there were incomplete or unfinished.

4. Results and Discussion

4.1 Demographic profile of the survey respondents

The demographic information solicited was categorised according to age, gender, ethnic group, academic year of study and the area of residence. The ages ranged between 18 and 49 years with a mean of 21.56 years. However, most of the students ranged between 18 and 26 years. The respondents consisted of 47% males and 53% females. The majority of the respondents were Black (91%) and the remaining 9% were shared equally among coloured, Indian or Asian and White. Of the 309 respondents, 41% were 1st year students, 30% 2nd year students, 11% 3rd year students, 16% 4th year students and 3% were 5th year students.

4.2 Place of residence

Data regarding the students' place of residence were collapsed into six areas in close proximity of the APB campus, plus other areas as detailed in Table 1. Only 34% of the respondents reside within a radius of APB in the following located areas: Braamfontein (11%), Auckland Park (10%), Brixton (8%), Melville (3%), Parktown (1%) and Jan Hoffmeyer (Fitas) (1%). These students are within walking or cycling distance of the APB campus. Two thirds (66%) of the respondents reside much further away from APB campus. The top five other areas of residence are Soweto (14%), Johannesburg Central Business District (CBD) (13%), Ekurhuleni (10%), Doornfontein (8%) and Northcliff/Randburg (7%) without metro rail network connections. The remaining 14.2% of respondents resided as far as South Gate, Northgate, Alexandra/Sandton and Eastgate. Respondents that travel the furthest are those in Midrand, Centurion and Pretoria.

4.3 Effect of transport-related issues on class attendance

Three-quarters of the respondents (75%) indicated that they have been late for lectures (class) due to transport issues. A tendency exists among some students to leave class before the end of lecture. The extent to which this happens was assessed. Of the respondents 45% admitted leaving a class before the end of the scheduled time. Reasons for leaving class earlier were solicited from respondents and most students stated that they wanted to avoid traffic, get chance of catching the unreliable public transport and gain access to available taxis to their place of residence by avoiding long taxi queues. Some mentioned that safety was their main concern. It is therefore essential to analyse their transport related experiences.

Table 1. Place of residence of respondents

APB surrounding residence area	Frequency	Percentage (%)
Braamfontein	34	11.0
Auckland Park	31	10.0
Brixton	25	8.1
Melville	9	2.9
Parktown	3	1.0
Jan Hoffmeyer (Fitas)	3	1.0
Total APB surrounding areas	**105**	**34.0**
Soweto	43	14.0
Johannesburg CBD	40	13.0
Ekurhuleni	32	10.2
Doornfontein	24	7.8
Northcliff / Randburg	21	6.8
South Gate	14	4.5
Midrand	8	2.6
North Gate	5	1.6
Alexandra / Sandton	5	1.6
Centurion / Pretoria	4	1.3
East Gate	3	1.0
Home (not specified)	3	1.0
West Gate	2	0.6
Other's area of residence	**204**	**66.0**
Total	**309**	**100.0**

4.4 Frequency of trips and modes of transport utilised

The majority of the respondents (88%) make 1-2 trips per day between their place of residence and the campus, while 10.4% of the respondents make 3-4 trips and only 1.6% made more than 5 trips per day, due to the lack of reliable transportation network to connect directly to the APB campus.

Respondents were asked to indicate which mode of transport they depended upon most to travel to APB among the 13 listed modes (Table 2). Then they were asked to identify their secondary or alternative mode of transport different from the main mode of transport (Table 2 – multiple responses were allowed). From Table 2, the main mode of transport used by non-resident students is the inter-campus bus service (29.4%), followed by minibus taxis (23.9%), walking (15.5%) and private car (14.9%). Of the modes of transport that have become available since 2013, the Rea Vaya BRT system is used by 6.5% of the respondents, Uber by only 1% and Tuk-Tuk by 0.3%. Since no one indicated cycling it seems that the bike lanes have not had the desired effect of stimulating cycling in Johannesburg.

Table 2. Main and alternate mode of transport to reach APB

Mode of transport	Main mode		Secondary mode: top 5	
	Frequency	Percentage	Frequency	Percentage
Inter-campus bus service (Megabus)	91	29.4%	120	38.8%
Minibus Taxi	74	23.9%	119	38.5%
Walking	48	15.5%	79	25.6%
Private Car	46	14.9%	79	25.6%
Rea-Vaya BRT system	20	6.5%		
Metro-Bus	10	3.2%		
Metro-Rail	6	1.9%		
Gautrain Rail	5	1.6%		
Gautrain Bus	3	1.0%		
Uber / Taxify	3	1.0%	69	22.3%
Putco bus	2	0.6%		
Tuk-Tuk	1	0.3%		
Cycling	0	0%		
Total	**309**	**100.0%**		

From Table 2 it follows that the inter-campus Megabus service is the most used type of transport with 29.4% of respondents using it as a main mode and 38.8% as an alternative option. Minibus taxis are the second most used transport mode, used by 23.9% of respondents as a main transport mode and 38.5% as an alternative mode. Of the respondents, 15.5% identified walking as a main mode and 25.6% as an alternative mode. Privately-owned cars are used by 14.9% of respondents as a main transport mode and by 26.6% as an alternative mode of transport. What has emerged as an unexpected fact is that although only 1% of respondents use Uber or Uber's competitor known as Taxify/Bolt as a main transport, as many as 22.3% use it as an alternative transport mode.

4.5 Average trip length and distance travelled
The average length of a trip, weighed against its cost, can determine the selected mode of transport. About half (51.7%) of the respondents travel not longer than 31 minutes to APB, with 15.2% of respondents travelling more than one hour to APB and 6.1% travelling even more than 1.5 hours (Figure 3). On the positive side, 26.5% of respondents travel a maximum of 15 minutes and a further 25.20% travel a maximum of 30 minutes.

The study attempted to estimate distances travelled by students from their place of residence to APB. Of the respondents, 29.1% travelled less than 5 km while a further 17.5% travelled less than 10 km (Figure 4). Thus, about 47% of the respondents' travel a distance that did not exceed 10 km, and 53% of the respondents travel more than 10 km per day.
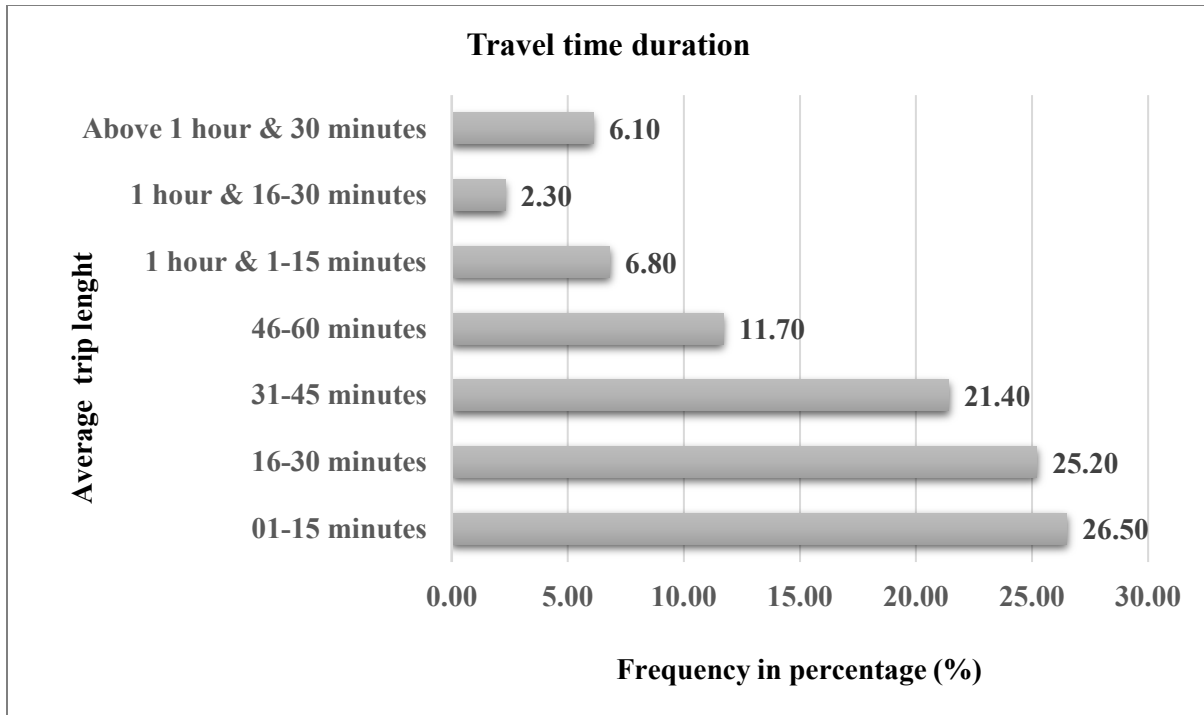
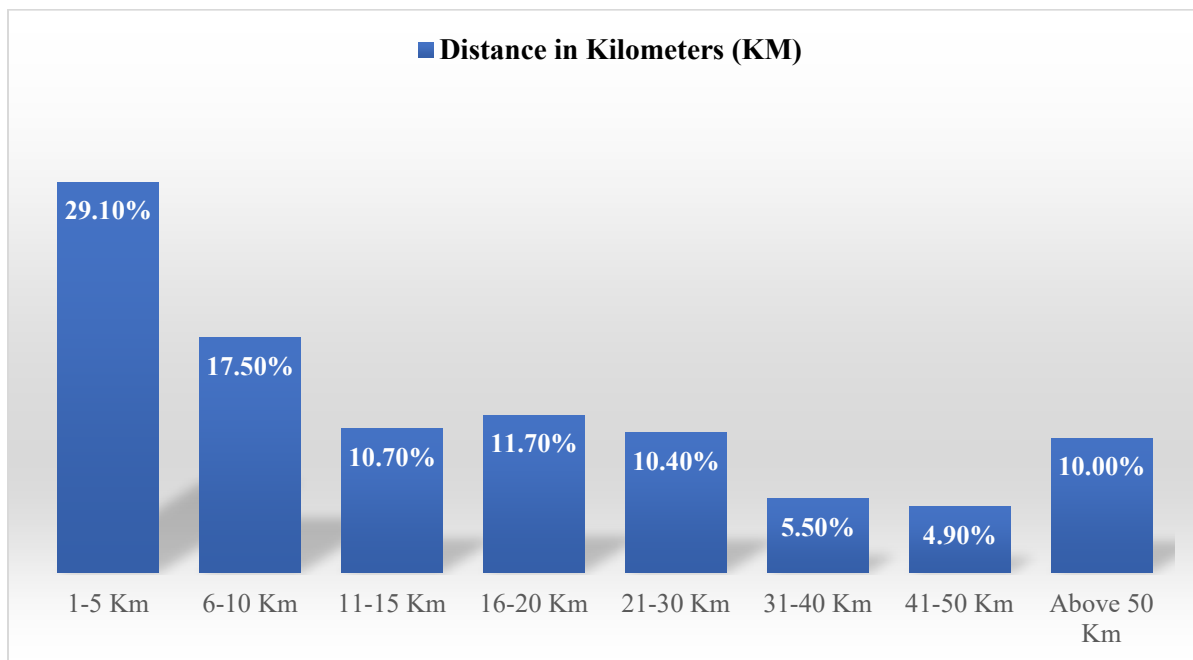**Figure 3. Average duration from place of residence to APB**

Figure 4. Travelling distance from place of residence to APB

4.6 Cost of transportation and funding

Students have to contend with several costs related to completing their studies, such as course fees, books, accommodation and travelling costs. The cost of a specific mode of transport could contribute to the choice of transport

mode, this could be the reason why the free inter-campus bus is always ranked the number one choices . Furthermore, the availability of finance may determine a student's choice of transport mode. To understand the transportation costs involved in travelling to and from APB, students were asked to indicate their transport expenditure per day selecting one of the categories in Table 3.

Table 3. Cost of travelling to and from APB per day

Traveling cost	Frequency	Percentage (%)	Cumulative Percent (%)
Less than R20.00	160	51.8	51.8
R21.00 - R50.00	96	31.1	82.9
R51.00 - R60.00	22	7.1	90.0
R61.00 - R70.00	8	2.6	92.6
R71.00 - R80.00	7	2.3	94.9
R81.00 - R90.00	2	.6	95.5
R91.00 - R99.00	4	1.3	96.8
R100.00 and above	10	3.2	100.0
Total	**309**	**100.0**	

Daily transportation costs for respondents ranged from less than R20 to more than R100 per day (Table 3). However, students who use the inter-campus Megabus, would travel free and 29% of respondents indicated that they use this as a primary form of transport to APB. About half of the respondents (51.8%) spend less than R20 per day (which could include R0), with a further 31.1% spending between R21 and R50 and the remaining 17.1% spend more than R50 per day. According to Mbara and Celliers (2013:4), students made an average of five trips per week using a variety of transport modes. If a student spends about R20 per day on transportation costs it converts into R100 per week, R400 per month and R4 000 for 10 months. For a student who spends R50 per day it would convert into R1 000 per month and R10 000 per annum. For a student who spends R100 per day on transportation costs, it would convert into R20 000 per annum, equivalent to some universities' yearly fees.
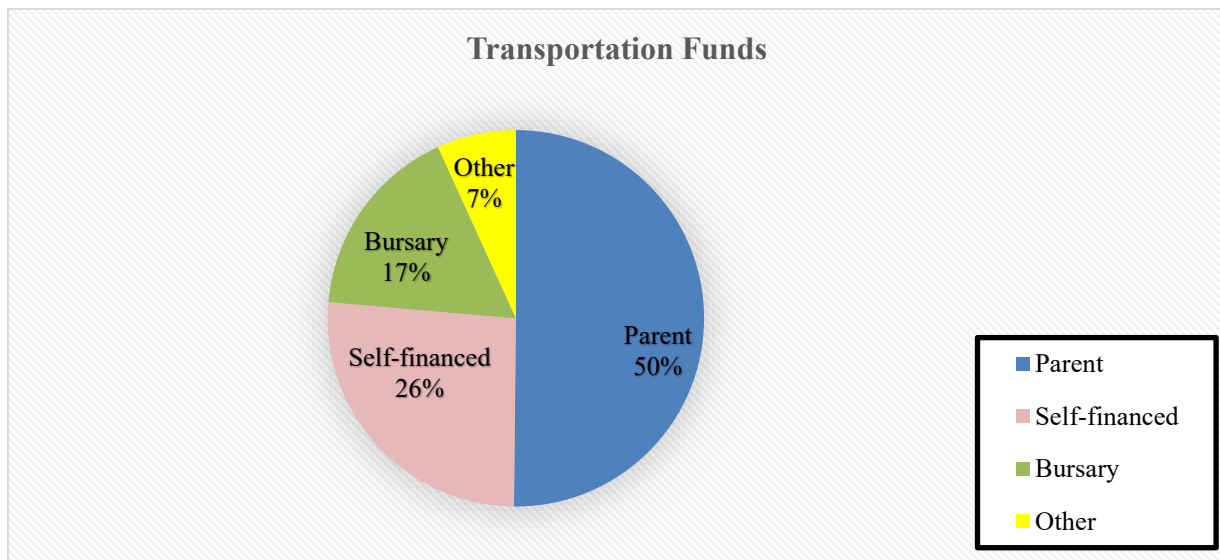

Figure 5. Transportation funds

Students were asked to identify their sources of funding from four categories: Parents, bursary, self-financed and if others to specify. Figure 5 indicates that half (50%) of the respondents are funded by their parents, while 26% and 17% are self-funded and bursary funded, respectively. A small proportion (7%) of the respondents are funded by other sources, such as close relatives, spouses, National Student Financial Aid Scheme (NSFAS) and transport aids received from commercial residence around UJ campuses.

4.7 Peak times travelling to APB

Students were asked to select the times of the day during which they experienced difficulty in travelling to APB (Figure 6). Of the respondents 62% indicated that the early morning (05:00-09:00) was the hardest time to travel to APB. This would apply to students attending morning classes. Of the respondents 29% indicated that late afternoon (15:00-18:00), with a further 25% indicating 18:00 to 21:00 as difficult times to travel to APB. These would apply to students attending evening classes. Why non-resident students would want to go to APB after 21:00 hours, is not clear but 19.1% indicated that late night (later than 21:00) were the main times which they experienced difficulties to reach APB owing to a lack of transportation modes.

The students were asked to select the times of the day that they were experiencing difficulty in returning from APB to their place of residence and 45% of the respondents confirmed that late afternoon (15:00-18:00) was the challenging time. This was followed by 43% of respondents confirming that in the evening (18:00-21:00) it was challenging and 31% indicated that late night (later than 21:00) was the hardest time. Another anomaly is evident in the fact that 17% of respondents confirmed that the early morning (05:00-09:00) was a challenging time to leave APB. Why would a non-resident student want to leave APB between 05:00 and 09:00 Some reasons are related to the cross-night studies, 24hours in the library areas or attending group project. Therefore, need to go and rest in the place of residence.
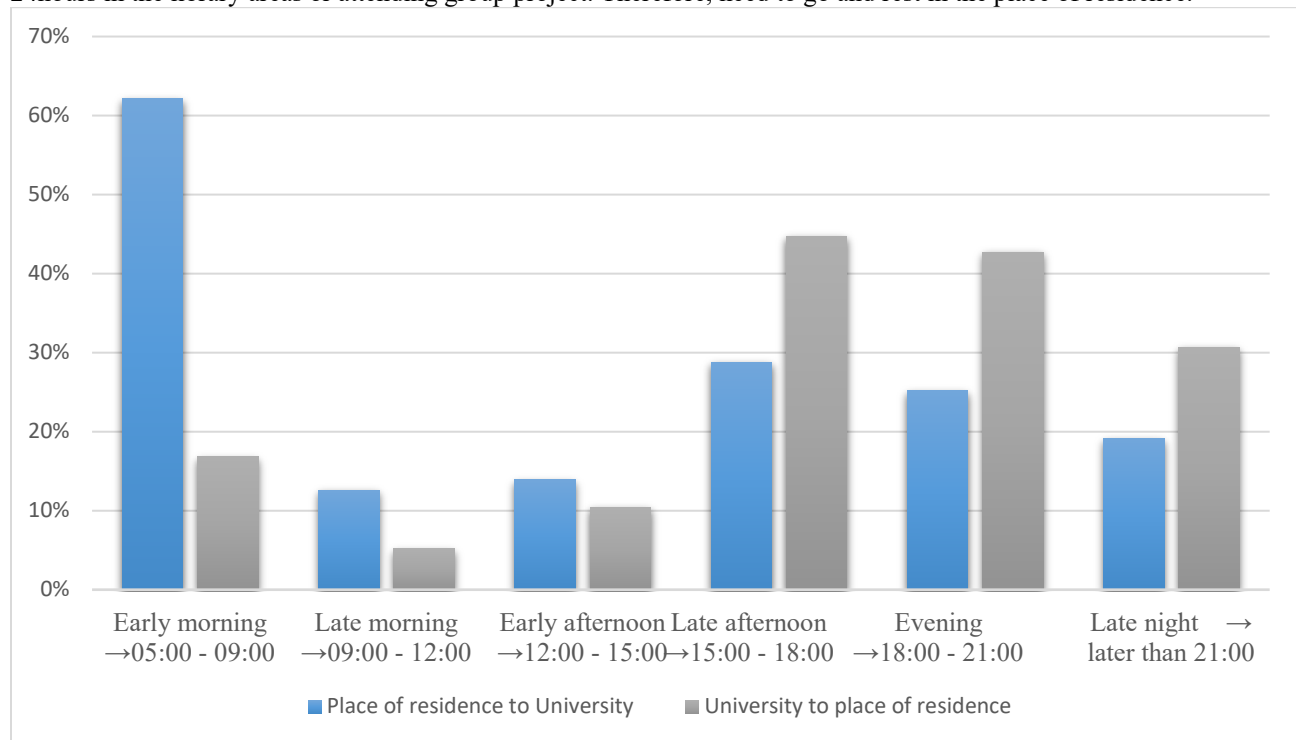

Figure 6. Peak times of transport to and from APB

4.8 Transportation challenges

Students are exposed to transport delays, unreliable transportation and costly transport fees. Therefore, students were asked to identify from a list of eight possible transport problems which ones they experienced *en route* to or from APB, namely cost, time, safety, availability, accessibility, comfort, convenience and weather conditions. Out of the respondents, 67.3% identified transport issues as time services reliability create transportation difficulties, followed

by safety (43.4%), availability (40.5%), cost (34.3%) and comfort (21.0%). The concepts were not defined for the respondents, and they attached their own interpretations to each concept, relative to their experiences.

The incidence of arriving late at class as a result of transportation challenges were confirmed by 75% of non-resident students who have arrived late. In addition, the tendency of students leaving their lectures before the end of scheduled closing time was confirmed by 45% of the non-resident students who confirmed that transportation problems such as transport availability is one of the reasons that contributes to poor attendance. Joseph and Olatunde (2010) stated that long distances to campus affect student attendance of classes and productivity to participate in class discussion due to the matter travelling distance have taken a lot of energy away from them.

4.9 Transportation mode analysis

The results of the study identified the most preferred modes of transport being the inter-campus Megabus service as main mode and minibus taxis as secondary mode of transport. The popularity of these modes depends on easy accessibility, affordability and reliability. The inter-campus bus service is highly affordable as it is free for registered students. Students in the vicinity of the two distant campuses can access the inter-campus bus service either in Soweto or Doornfontein and travel free to and from APB. Thus, this inter-campus bus provides critical transportation needs, about 29% of students relies on this service as the main of transport while 39% of the APB campus student considered this as their secondary mode of transport. In terms of accessibility and time (speed), the minibus taxi may be referred to as the quickest mode available to transport students to APB and return them to their places of residence. Results revealed that walking is another popular mode of transport owing to the close vicinity of students' place of residence to the campus. The Rea-Vaya BRT system and MetroBus are the more preferred bus type modes of transport. These buses tend to be reliable by adhering to bus-schedules. What is evident is that in spite of the Johannesburg Road Agency spending millions on the construction of 'bike lanes' in and around the APB and APK campuses, these do not seem to be used at all by the non-resident students, not even those living within a 5 km radius of the APB campus, reason could be lack of bicycle tools.

4.10 Duration, journey distance and cost

Time, distance and cost are factors that relate to each other: the longer the distance travelled the longer the average trip duration and the higher the cost. Results depict this linearity between distance and duration of the trip; 50% of non-resident students travel less than 30 minutes to arrive at APB while 47% of the non-resident students indicated that they travel less than 10 kilometres, while 52% indicated that they spend less than R20 per day on travel expenses to and from APB. From these results the association between distance travelled, duration of trip and cost seems to be evident.

6. Conclusion

Students spend substantial energy, time and money travelling to APB from their place of residence and vice versa. Improving access to education through improved transportation would need to take into consideration the following conclusions. It follows that the free inter-campus bus system provides in a dire transport need of students located in the vicinity of Soweto, Auckland Park and Doornfontein in order to reach APB campus and to return home. It is possible that students make use of an alternate mode of transport, such as walking, to reach these three campuses from whence they can then travel free of charge to APB. This would partly explain why the daily transport expenses of half of the respondents were less than R20 per day. The fact that minibus taxis was the second most preferred mode of transport is understandable as they service an extensive geographic area. In spite of beautiful bike lanes being constructed in the areas surrounding APB, none of the respondents indicated that cycling is a transport mode option.

7. Recommendation and future research

The inter-campus bus service has significant influence of students travelling all over campuses and plays crucial role in the transportation of non-resident students to APB campus. The research recommends an expansion of service with the introduction of information Communication Technology (ICT) to improve student transportation service, also the university can partner with surrounding universities such as Mancosa, Rosebank college and Wits to expand transportation network. Future research could focus on the adequacy of the scheduling of the inter-campus bus service and customer (students) satisfaction on public transport. The fact that non-residents are not interested in cycling should be further investigated to determine the main reasons for this lack of interest and to develop a system to entice commuter cycling. It is also advisable to study young adults travelling behaviour across cities, as a matter fact lifestyle

can affect transportation choices, additionally an investigation of resident student's commuting habits whenever they go off campus.

References

Behrens, R. (2004). *Child and Learner Travels in Cape Town: Problems and Prospects*. Urban Forum. 15(3), 254-278

Berrington, A., & Mikolai, J. (2014). *Young adults' license-holding and driving Behavior in the UK. Full Findings.* London: RAC Foundation.

Bonnett, M. (2012). Environmental concern, moral education and our place in nature. *Journal Moral Education*. 41, 285–300.

Broll.co.za (2011). Johannesburg CBD and Braamfontein Office Market Report, Maximising property potential. [Online] Available at: http://www.sacommercialpropnews.co.za/files.php?force&file=attachment/JHB_Braamfontein_Office_Market_Report_596801757.pdf [Viewed 18 May 2017]

Cantwell, M., Caulfield, B., O'Mahony, M., (2009). *Examining the factors that impact public transport commuting.* J. Pub. Transport. 12 (2), 1–21.

City of Johannesburg. (2014). *Making Joburg a Cycle Friendly City*. The City of Johannesburg. [Internet] Available at: https://www.environment.gov.za/sites/default/files/docs/enablingnmt_environment_theme1.pdf

Council for Higher Education (2016) *South African higher education reviewed: Two decades of democracy.* Pretoria.

de la Torre, R.; Onggo, B.S.; Corlu, C.G.; Nogal, M.; Juan, A.A. (2021). The Role of Simulation and Serious Games in Teaching Concepts on Circular Economy and Sustainable Energy. *Energies* 2021, 14, 1138. https://doi.org/10.3390/en14041138

Delbosc, A., & Currie, G. (2014b). Using discussion forums to explore attitudes toward cars and licensing among young Australians. *Transport Policy, 31*, 27–34.

Dell'Olio, L., Ibeas, A., and Cecin, P. (2011). *The quality of service desired by public transport users*. Transport Policy, 18 (1), 217-227

Department of Education. (2003). *Review of the Financing, Resourcing and Costs of Education in Public Schools*, Pretoria.

Goodwin, P. (2012). Three views on 'peak car.' *World Transport Policy & Practice, 17*(4), 8–17.

Govender, J.P. (2001). *Report on Privatisation in Urban Municipalities: The Case of Durban Transport*. Trade Union Research Project (TURP): University of Natal

Govender, R. and Allopi, D. (2007). *Analysis of the Scientific Aspects Related to Minibus Taxi Collisions*. SATC 2007,161-167

Hjorthol, R. (2016). Decreasing popularity of the car? Changes in driving license and access to a car among young adults over a 25-year period in Norway. *Journal of Transport Geography, 51*, 140–146.

Hjorthol, R. J., & Bjørnskau, T. (2005). Gentrification in Norway capital, culture and convenience. *European Urban and Regional Studies, 12*(4), 353–371.

Jacques, C., Manaugh, K., El-Geneidy, A., (2013). Rescuing the captive [mode] user: *an alternative approach to transport market segmentation*. Transportation 40 (3), 625–645.

JDA. (2015). *Cycle lane to link university and Park Station.* Available at http://www.jda.org.za/index.php/latest-news/1632-cycle-lane-to-link-university-and-park-station [Viewed 29 July 2018]

Joseph, O. and Olatunde, Y.P. (2010). *University Location and Academic Achievement*. Doctoral dissertation, Kampala International University. Viewed February 18, 2017. [Internet] Available from: http://ccsenet.org/journal/index.php/ass/article/download

Kaplan, D. H. (2015). 'Transportation sustainability on a university campus. *International Journal of Sustainability in Higher Education*. 16(2),pp. 173–186. doi: 10.1108/IJSHE-03-2013-0023.

Kasayira, J.M., Chipandambira, K.S. and Hungwe, C. (2007). *Study on Stressors faced by University Students and their Coping Strategies: A Case Study on Midlands State University Students in Zimbabwe*. 37th ASEE Frontiers in Education Conference, Milwaukee, USA, October 10-13, 2007.

Kopnina, H., Blewitt, J. (2014). Sustainable Business: Key Issues; Routledge: Oxon, United Kingdom.

Kuhnimhof, T., Armoogum, J., Buehler, R., Dargay, J., Denstadli, J., & Yamamoto, T. (2012a). Men shape a downward trend in car use among young adults: Evidence from six industrialized countries. *Transport Reviews, 32*(6), 761–779.

Kuhnimhof, T., Buehler, R., Wirtz, M., & Kalinowska, D. (2012b). Travel trends among young adults in Germany: Increasing multimodality and declining car use for men. *Journal of Transport Geography, 24,* 443–450.

Latinopoulos, C., Le Vine, S., Jones, P., & Polak, J. (2013). *On the move: Car, rail and bus travel trends in Scotland.* London: RAC Foundation.

Le Vine, S., & Jones, P. (2012). *Making sense of car and train travel trends in Britain*. London: RAC Foundation.

Le Vine, S., Jones, P., Lee-Gosselin, M., & Polak, J. (2014). Is heightened environmental-sensitivity responsible for the drop in young adults' driving-license-acquisition rates? *Journal of the Transportation Research Board, 2465,* 73–78.

Le Vine, S., Polak, J., & Kuhnimhof, T. (2013). Case study of Great Britain: Socioeconomic changes, and variations in driving trends by income and location. In Institut für Mobilitätsforschung/Institute for Mobility Research (Ed.), *Mobility y: The emerging travel patterns of Generation Y* (pp. 27-34). Munich: Institute for Mobility Research.

Maluleke, K.J. (2013). Instilling safety culture in the passenger rail transport industry within the South African context. Journal of Transport and Supply Chain Management, 7(1), Art. No. 84, 6 pages.

Mbara, T.C & Celliers, C. (2013). Travel patterns and challenges experienced by UJ non-residents students, *Journal of Transport and Supply Chain Management*, 7(1), Art. #114, 8 pages.

Mbara, T.C. (2016). *Tuk-tuk, "new kid on the block" in Johannesburg: Operational and user travel characteristics, competition and impacts*. Journal of Transport and Supply Chain Management 10(1), Art. #214, 9 pages.

McMahon, E. (2012). Bicycles Belong. [Online] Available at: https://www.itdp.org/bicycles-belong/ [Accessed 23 July 2018]

Morgen, N. (2017). *Why Joburg's bike lanes are not well used.* Available at: https://www.wits.ac.za/news/latest-news/in-their-own-words/2017/2017-04/why-joburgs-bike-lanes-are-not-well-used.html. (Viewed: 29 July 2018)

Mudau, T. J. (2017). An exploration of the challenges faced by students residing off-campus in rural universities in South Africa. *Gender and Behaviour.* Vol 15, (4)

Mugoro, J. (2014). *Transport problems for students and their effects on attendance in community secondary universities in Dar es Salaam city, Tanzania*. Masters. University of Tanzania. [Internet]. Available at: http://repository.out.ac.tz/757/1/JOHANES_MUGORO.pdf

Muslim, M. H., Karim, H. A. and Abdullah, I. C. (2012) 'Challenges of Off-Campus Living Environment for Non-Resident Students' Well-Being in UiTM Shah Alam', *Procedia - Social and Behavioral Sciences*, 50(July), pp. 875–883. doi: 10.1016/j.sbspro.2012.08.089.

National Research Foundation. (2017). Student Travel Grant Guideline for 2017. [Internet] Available from: https://www.ufs.ac.za/docs/librariesprovider40/bursaries-2017/nrf-student-travel-grant-guideline-2017.pdf?sfvrsn=4 (Viewed 20 September 2017)

Nkambule, E. & Govender, P. K. (2014). Exploring the Mini-Bus Taxi as a Means to Improving Public Transportation in South Africa. *Global Journal of Interdisciplinary Social Sciences*. 3(3), pp. 185–189.

Noble, B. (2005). Why are some young people choosing not to drive? *Proceedings of the European Transport Conference,* Strasbourg, September 18–20, 2005.

Office for National Statistics. (2013). *Family spending, 2013 Edition.* London: Office for National Statistics.

Paepe, L., De Vos, J., Van Acker, V. & Witlox, F. (2018). 'Changes in travel behavior during the transition from secondary to higher education: A case study from Ghent, Belgium. *Journal of Transport and Land Use*, 11(1), pp. 477–498.

Parliamentary Monitoring Group. (2015). UBER South Africa. [Internet] Available at: http://pmg-assets.s3-website-eu-west-1.amazonaws.com/150901Uber_South_Africa.pdf

Pillay, P. (2002-3). *Administered Prices: Education*. A report for National Treasury. Pretoria

PMG. (no date) Uber South Africa. Available from: http://pmg-assets.s3-website-eu-west-1.amazonaws.com/150901Uber_South_Africa.pdf. (Viewed 20 April 2017)

Ramadiro, B. (2003). *University or Food? The Cost of Education*. Indicator South Africa. 20(1), 1-6

Rea Vaya. (2014). *Centre for public service innovation (CPSI)*. Available from: www.reavaya.co.za. (Viewed: 17 July 2018).

Rogan, M.J. (2006). *Dilemmas in Learner Transport: An Impact Evaluation of a School Transport Intervention in the Ilembe District, KwaZulu Natal*. Master's thesis. School of Development Studies, University of KwaZulu Natal

Royal Academy of Engineering. (2015). The Transport Congestion Challenge, getting the most out of UK's Road and Rail Network. London: Royal Academy of Engineering. Pg 10. Available at: http://www.raeng.org.uk/RAE/media/Publications/Reports/The-Transport-Congestion-Challenge.pdf [Viewed 18 May 2017]

Sabean, C. (2007). Student Walking Distance Review. Nova Scotia Department of Education. [Internet] Available from: https://www.ednet.ns.ca/docs/studentwalkingdistance.pdf (Viewed 20 September 2017)

Sandton Chronicle (2013). *New Rea Vaya route opens.* Available from//: https://sandtonchronicle.co.za/76884/new-rea-vaya-route-opens-3/. (Viewed: 29 July 2018)

South Africa. (2009). National Land Transport Act, 2009. *Government Gazette*, 526(32110): 1-52, April 8.

Student Welfare Directorate (SWD). (2010). *Regular University Attendance. Information for Parents and Carers*. North South of Wales Department of Education & Training. Viewed May 16, 2017. [Internet] Available from: https://www.det.nsw.edu.au/.../student.../att_proc.pdf

Timmons, L. (2014). The Uncritical Commute: The impact of students' living situations while at university. University of Glasgwo. School of Psychology. [Internet] available at: http://www.psy.gla.ac.uk/~steve/localed/docs/LukeTimmons.pdf [Viewed 05 May 2017]

University of Johannesburg, (UJ). (2018) The Higher Education Management Information System (HEMIS).

Van Acker, V. (2017). Peak car: A generational approach. *Proceedings of the BIVEC-GIBET Transport Research Days 2017,* Liège, Belgium, May 18–19.

Yavuz, N., & Welch, E.W. (2010). Addressing fear of crime in public space: gender differences in reaction to safety measures in train transit. *Urban Studies Journal*. 47 (12), 2491-2.

Biography

Adrien ILumbe Laby, he is postgraduate student in logistics management and passionate about the use of data analytics in supply chain associated to quantitative techniques. He holds various positions within the industries as an assistant lecturer for the department of Transport and Supply Chain at the University of Johannesburg (UJ) and a logistics consultant for start-up companies. Further research interests include humanitarian disaster relief, the logistics of international trade and freight distribution.

Sbusiso Shabalala operates as a sourcing professional at one of the leading automotive organizations in South Africa. He earned three qualifications within the logistics field from the University of Johannesburg. He has tutored purchasing while attending his BCom honours studies at University of Johannesburg.

Boitwarelo Molokwane obtained her BCom honours logistics from the University of Johannesburg. Her main passion relies on supply chain with a main focus on supplier relationship management for automobile companies. Currently, she is actively involved in industrial projects where she combines her knowledge and expertise to assist organisations within their supply chain to achieve excellence outcomes.

Juanita Vander Walt holds a master's degree in Logistics from the University of Johannesburg. She started her academic career at the Technikon of Witwatersrand in 2001 and joined the Department of Transport and Supply Chain in 2004 as a lecturer and is currently deputy head of Department on the Bunting Road Campus. Juanita has taught various subjects throughout her career and is passionate about academia. Her research interests are logistics in forensics and urban farmer development such as Izindaba Zokudla.