

Q

\_

This author profile is generated by Scopus earrow

# Adriana, Martina Cecilia

connect to mendeley /	
how all information	
3 5 1	
Citations by <b>3</b> documents Documents <u>h-index</u>	
Set alert 🔲 Save to list 🛷 Edit profile 🚥 More	
$\sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{j$	T: (r)
Jocuments (5) Impact Cited by (3) Preprints (0) Co-authors (10)	Topics (5)
Awarded grants (0)	
<i>f</i> ou can view, sort, and filter all of the documents in <u>search results format</u> .	
sort by sove all to list sort by	Date (newest)
-onference Peper	
Conference Paper Relation of traffic-related air pollution and people's duration of stay at	1
Conference Paper Relation of traffic-related air pollution and people's duration of stay at idewalk café/restaurant	1 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M.	1 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at Sidewalk café/restaurant Ndriana, M.C., Wartaman, A.S., Taki, H.M. NP Conference Proceedings, 2023, 2646, 020016	1 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract V Full text V Related documents	1 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at Sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. NP Conference Proceedings, 2023, 2646, 020016 Show abstract V Full text V Related documents	1 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract V Full text V Related documents	1 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract V Full text V Related documents Article • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS	1 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract V Full text V Related documents Article • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI	1 Citations 2 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract V Full text V Related documents Article • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI Adriana, M.C., Situmorang, R., Aji, B.J. ingtium 2023 (49) pp. 20–29	1 Citations 2 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at Sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract ✓ Full text ✓ Related documents Article • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI Adriana, M.C., Situmorang, R., Aji, B.J. Spatium, 2023, (49), pp. 20–29 Show abstract ✓ Full text ✓ Related documents	1 Citations 2 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract V Full text V Related documents Article • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI Adriana, M.C., Situmorang, R., Aji, B.J. ipatium, 2023, (49), pp. 20–29 Show abstract V Full text V Related documents	1 Citations 2 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract V Full text V Related documents Article • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI Adriana, M.C., Situmorang, R., Aji, B.J. spatium, 2023, (49), pp. 20–29 Show abstract V Full text V Related documents 	1 Citations 2 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at Sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. AIP Conference Proceedings, 2023, 2646, 020016 Show abstract ✓ Full text ✓ Related documents Article • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI Adriana, M.C., Situmorang, R., Aji, B.J. Spatium, 2023, (49), pp. 20–29 Show abstract ✓ Full text ✓ Related documents ————————————————————————————————————	1 Citations 2 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at sidewalk café/restaurant Adriana, M.C., Wartaman, A.S., Taki, H.M. NIP Conference Proceedings, 2023, 2646, 020016 Show abstract ✓ Full text ✓ Related documents Article • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI Adriana, M.C., Situmorang, R., Aji, B.J. Spatium, 2023, (49), pp. 20–29 Show abstract ✓ Full text ✓ Related documents Conference Paper • Open access Study of Trans Siginjai shelter coverage on corridor I and II in Jambi City of ndonesia	1 Citations 2 Citations 0 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at idewalk café/restaurant vdriana, M.C., Wartaman, A.S., Taki, H.M. VIP Conference Proceedings, 2023, 2646, 020016 Show abstract ✓ Full text ✓ Related documents verticle • Open access EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI vdriana, M.C., Situmorang, R., Aji, B.J. Spatium, 2023, (49), pp. 20–29 Show abstract ✓ Full text ✓ Related documents Conference Paper • Open access Study of Trans Siginjai shelter coverage on corridor I and II in Jambi City of ndonesia etiawan, M.A., Adriana, M.C., Sitawati, A.	1 Citations 2 Citations 0 Citations
Conference Paper Relation of traffic-related air pollution and people's duration of stay at idewalk café/restaurant variana, M.C., Wartaman, A.S., Taki, H.M. JP Conference Proceedings, 2023, 2646, 020016 whow abstract v Full text v Related documents wrticle • Open access CXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS N JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI variana, M.C., Situmorang, R., Aji, B.J. patium, 2023, (49), pp. 20–29 whow abstract v Full text v Related documents conference Paper • Open access itudy of Trans Siginjai shelter coverage on corridor I and II in Jambi City of ndonesia etiawan, M.A., Adriana, M.C., Sitawati, A. OP Conference Series: Earth and Environmental Science, 2023, 1263(1), 012030	1 Citations 2 Citations 0 Citations

#### Don't miss out on new publications by this author!

Conference Paper • Open access	
The walkability concept based on pedestrian perceptions in Bandung City	0
Square, Indonesia	Citations
Dewi, L., Situmorang, R., Adriana, M.C.	
IOP Conference Series: Earth and Environmental Science, 2023, 1263(1), 012029	
Show abstract $\checkmark$ Full text $\checkmark$ Related documents	
Conference Paper	
The Best Alternative for Revitalising the Asset Area of PT. KAI in Kota Tua,	0
Jakarta	Citations
Ramadhani, A., Wartaman, A.S., Fatimah, E., Sitorus, A.M., Zikra, A.	
Lecture Notes in Civil Engineering, 2023, 334 LNCE, pp. 331–346	
Show abstract 🗸 🛛 Full text 🗸 🛛 Related documents	

Display 10 results 🗸 🗸

View all references

#### **Document & citation trends**



Citation overview Analyze author output

#### Author Position for 2014 - 2023

First author	50%		^
2 Documents	2 Average citations	<b>1.614</b> FWCI	
Last author	25%		~
Co-author	25%		~
Single author	0%		~

Show author position details

Back to top

noout scopus

What is Scopus

Content coverage

Scopus blog

Scopus API

Privacy matters

#### Language

日本語版を表示する 查看简体中文版本 查看繁體中文版本 Просмотр версии на русском языке

#### **Customer Service**

Help Tutorials Contact us

#### ELSEVIER

Terms and conditions  $\neg$  Privacy policy  $\neg$  Cookies settings

All content on this site: Copyright © 2025 Elsevier B.V. *¬*, its licensors, and contributors. All rights are reserved, including those for text and data mining, AI training, and similar technologies. For all open access content, the relevant licensing terms apply.

We use cookies to help provide and enhance our service and tailor content.By continuing, you agree to the use of cookies  $\neg$ .

*RELX*<sup>™</sup>

### **Cover Jurnal**



#### Daftar Isi



he first community housing model constructed in Hungary - The collective house in Miskolc	
dám Pirity, Kornélia Kissfazekas	010-019
A pdf	
xploring the transport mode choice of University students in Jakarta: A case study of Universitas Trisal	ti
lartina Cecilia Adriana, Rahel Situmorang, Bregas Jiwandono Aji	020-029
[] pdf	
patial video projection and public open spaces: A distinct bibliometric study approach	
ma Najjar, Fatma Aycim Turer Baskaya	030-041
La pdr	
ethinking Soviet Era mass housing in Kazakhstan	
ton Combanny Thomas Columb	042-050

redibility of legalization: Illegally constructed buildings in Serbia	
lavka Zeković, Ksenija Petovar	051-063
[2] pdf	
ertain aspects of governance in cultural heritage areas: The case of three archaeological si	tes in Serbia
ilica Maksić Mulalić	064-074
A pdf	
re we discriminating towards guests with disabilities? Accessibility analyses of public epublic of Slovenia	restaurants facilities in the
larko Kukanja, Saša Planinc	075-086
24 pdf	

.

#### **spatium** No. 49, June 2023, Belgrade

#### SCOPE AND AIMS

The review is concerned with a multi-disciplinary approach to spatial, regional and urban planning and architecture, as well as with various aspects of land use, including housing, environment and related themes and topics. It attempts to contribute to better theoretical understanding of a new spatial development processes and to improve the practice in the field.

#### EDITOR-IN-CHIEF

Jasna Petrić, IAUS, Belgrade, Serbia

#### **TECHNICAL EDITOR**

Nataša Čolić, IAUS, Belgrade, Serbia

#### SECRETARY

Milena Milinković, IAUS, Belgrade, Serbia

#### PUBLISHING COUNCIL

Jasna Petrić, President, IAUS, Belgrade, Serbia Ana Niković, Vice President, IAUS, Belgrade, Serbia Milena Milinković, Secretary, IAUS, Belgrade, Serbia

#### PUBLISHER

Institute of Architecture and Urban & Spatial Planning of Serbia, IAUS **Saša Milijić**, Director

#### ADDRESS

Institute of Architecture and Urban & Spatial Planning of Serbia, IAUS Spatium Serbia, 11000 Belgrade, Bulevar kralja Aleksandra 73/II tel: (381 11) 3207-300, fax: (381 11) 3370-203 e-mail: spatiumed@iaus.ac.rs, web address: www.iaus.ac.rs, www.spatium.rs

#### SUPPORTED BY

Ministry of Science, Technological Development and Innovation of the Republic of Serbia Spatium is indexed in SCOPUS, SCImago, DOAJ and Avery Index.

#### EDITORIAL BOARD

Branislav Bajat, University of Belgrade, Faculty of Civil Engineering, Belgrade, Serbia; Giancarlo Cotella, Politecnico di Torino, DIST - Interuniversity Department of Regional and Urban Studies and Planning, Torino, Italy; Tijana Crnčević, IAUS, Belgrade, Serbia; Nataša Danilović Hristić, IAUS, Belgrade, Serbia; Thomas Dillinger, TU Vienna, Institute of Spatial Planning, Research Unit Regional Planning and Regional Development, Vienna, Austria; Miša Đurković, Institute for European Studies, Belgrade, Serbia; Zeynep Enlil, Yildiz Technical University, Faculty of Architecture, Department of City and Regional Planning, Istanbul, Turkey; Marco Falsetti, University of Rome "Sapienza", Rome, Italy; Milorad Filipović, University of Belgrade, Faculty of Economics, Belgrade, Serbia; Evelyn Gustedt, Leibniz Universität Hannover, Akademie für Raumforschung und Landesplanung (ARL), Hannover, Germany; Andrej Gulič, Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia; Augustin Ioan, University of Architecture and Planning "Ion Mincu", Bucharest, Romania; Fernando Jerez, The University of Western Australia, School of Architecture, Landscape and Visual Arts, Crawley, Australia; Elina Krasilnikova, Volgograd State University of Architectural and Civil Engineering - Institute of Architecture and Urban development, Department of Urbanism and Theory of Architecture, Volgograd, Russia; Moscow Region "Research Urban Planning and Design Institute" (SUO "NIiPI Urban Development"), Moscow, Russia; Tamara Maričić, IAUS, Belgrade, Serbia; Saša Milijić, IAUS, Belgrade, Serbia; Bernhard Müller, Technische Universität Dresden, Dresden, Germany; Zorica Nedović-Budić, University of Illinois - Chicago, Department of Urban Planning & Policy, Chicago, IL, USA; University College Dublin, School of Architecture, Planning and Environmental Policy, Dublin, Ireland; Mark Oranje, University of Pretoria, Department of Urban and Regional Planning, Pretoria, South Africa; George Petrakos, University of Thessaly, School of Engineering, Department of Planning and Regional Development, Volos, Greece; Mina Petrović, University of Belgrade, Faculty of Philosophy, Department of Sociology, Belgrade, Serbia; Ratko Ristić, University of Belgrade, Faculty of Forestry, Belgrade, Serbia; Aleksandar Slaev, Varna Free University, Faculty of Architecture, Varna, Bulgaria; Nebojša Stefanović, IAUS, Belgrade, Serbia; Vladimir Stevanović, Serbian Academy of Sciences and Arts (SASA), Belgrade, Serbia; Elisavet Thoidou, Aristotle University of Thessaloniki, Faculty of Engineering, School of Spatial Planning and Development, Thessaloniki, Greece; Paolo Tomasella, ERPAC FVG - Ente Regionale per il Patrimonio Culturale del Friuli Venezia Giulia. Villa Manin, Passariano (Ud), Italy; Miodrag Vujošević, Belgrade, Serbia; Paul Waley, University of Leeds, School of Geography, Leeds, UK; Slavka Zeković, IAUS, Belgrade, Serbia; and Jelena Živanović Miljković, IAUS, Belgrade, Serbia.

#### PUBLISHING COUNCIL

Branislav Bajat, University of Belgrade, Faculty of Civil Engineering, Belgrade, Serbia; Tijana Crnčević, IAUS, Belgrade, Serbia; Tijana Dabović, University of Belgrade, Faculty of Architecture, Belgrade, Serbia; Branka Dimitrijević, Strathchyde University, Department of Architecture, Glasgow, UK; Omiljena Dželebdžić, IAUS, Belgrade, Serbia; Aleksandar Đukić, University of Belgrade, Faculty of Economics, Belgrade, Serbia; Miroljub Hadžić, University of Belgrade, Faculty of Economics, Belgrade, Serbia; Miroljub Hadžić, University Singidunum, Belgrade, Serbia; Boško Josimović, IAUS, Belgrade, Serbia; Nikola Krunić, IAUS, Belgrade, Serbia; Božidar Manić, IAUS, Belgrade, Serbia; Tamara Maričić, IAUS, Belgrade, Serbia; Saša Milijić, IAUS, Belgrade, Serbia; Zorica Nedović-Budić, University of Illinois – Chicago, Department of Urban Planning & Policy, Chicago, Illinois, USA; University College Dublin, School of Architecture, Planning and Environmental Policy, Dublin, Ireland; Marina Nenković-Riznić, IAUS, Belgrade, Serbia; Tanja Njegić, IAUS, Belgrade, Serbia; Saja Simonović Alfirević, IAUS, Belgrade, Serbia; Borislav Stojkov, Belgrade, Serbia; Dragutin Tošić, Belgrade, Serbia; and Miodrag Vujošević, Belgrade, Serbia:

#### COPY EDITORS - ENGLISH LANGUAGE PROOFREADING REVIEWERS

Sonja Stojanović, Niš, Serbia Terry Troy Jackson, Ljubljana, Slovenia DESIGN EDITOR Sanja Nikolić, Belgrade, Serbia COVER PAGE DESIGN Borjan Brankov, IAUS, Belgrade, Serbia

Printed in Serbia by "PLANETA PRINT", Belgrade, Serbia Number of copies: 200

Spatium is published half-yearly.

Gulnara Abdrassilova, Kazakh Leading Architectural and Civil Engineering Academy, Almaty, Kazakhstan; Melinda Benkő, Budapest University of Technology and Economics, Urban Planning and Design, Faculty of Architecture, Budapest, Hungary; Igor Bizjak, Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia; Bartosz Czarnecki, Białystok University of Technology, Faculty of Architecture, Białystok, Poland; Dorđe Dorđević, University of Belgrade, Faculty of Architecture, Belgrade, Serbia; Georgios Georgiadis, Aristotle University of Thessaloniki, School of Civil Engineering, Transport Engineering Laboratory, Thessaloniki, Greece; Vujadin Ivanišević, Institute of Archaeology, Belgrade, Serbia; Milena Krklješ, University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia; Nellya Leshchenko, Kyiv National University of Construction and Architecture, Department of Information Technology in Architecture, Kyiv, Ukraine; Milica Ljubenović, University of Niš, Faculty of Civil Engineering and Architecture, Niš, Serbia; Ilia Murtazashvili, University of Pittsburgh, Graduate School of Public & International Affairs, Pittsburgh, PA, USA; Ana Niković, IAUS, Belgrade, Serbia; Annamária Orbán, Faculty of Economics and Social Sciences (GTK), Department of Sociology and Communication, Budapest, Hungary; Richard Sendi, Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia; Ivana Spasić, University of Belgrade, Faculty of Philosophy, Institute for sociological research, Belgrade, Serbia; Ranka Stanković, University of Belgrade, Faculty of Mining and Geology, Belgrade, Serbia; Christos Tsioulianos, Aristotle University of Thessaloniki, Faculty of Engineering, School of Rural & Surveying Engineering, Thessaloniki, Greece; and Ann Varley, University College London, Department of Geography, London, UK.

# EXPLORING THE TRANSPORT MODE CHOICE OF UNIVERSITY STUDENTS IN JAKARTA: A CASE STUDY OF UNIVERSITAS TRISAKTI

Martina Cecilia Adriana<sup>1</sup>, Urban and Regional Planning Program Study, Universitas Trisakti, Jakarta, Indonesia Rahel Situmorang<sup>10</sup>, Urban and Regional Planning Program Study, Universitas Trisakti, Jakarta, Indonesia Bregas Jiwandono Aji<sup>1</sup>, Urban and Regional Planning Program Study, Universitas Trisakti, Jakarta, Indonesia

It is difficult to capture the unique and complex travel behaviour of students due to differences in demographics and locations. Students' trips contribute to Jakarta's traffic, yet it is an area that has been rarely explored. Therefore, this study aims to investigate the transport mode choice and factors affecting the travel behaviour of Universitas Trisakti students. The results show that despite living in Jakarta, a motorcycle and car-dominated city, they prefer to use sustainable transport. Public transport is the most common mode, followed by motorcycles, walking, cars, and ride-hailing, but not cycling, unlike their peers in other Indonesian cities. Students with more vehicles in their families and with licenses tend to use motorcycles and cars to go to campus. Moreover, student allowances are found to have a positive and significant influence on walking and ride-hailing choices. In terms of motorcycle use, male students are more likely to use them than female students. Travel distance and travel time also affect the choices of walking, motorcycles, and ride-hailing, whereby the longer the distance and travel time, the less likely students are to choose those transport modes over public transport. In addition, a positive regression is found between transport expenses and the choice of cars or ride-hailing. In conclusion, policies and infrastructure, such as parking fees and bicycle lanes, as well as better public transport and walking facilities, are needed to ease traffic and create a better campus environment. *Key words*: mode choice, university students, Logit Model, Universitas Trisakti, Jakarta.

#### **INTRODUCTION**

Jakarta, as the capital city, is the centre of the economy, politics, and culture in Indonesia. Jakarta is also the densest city in Indonesia, and it serves the surrounding metropolitan area called Jabodetabek. Because of its density, it faces numerous urban problems, including serious transport problems. The high level of motorization and urban sprawl cause congestion, air pollution, greenhouse gas emissions, traffic accidents, and noise pollution. In 2019, Jakarta was ranked as the 7<sup>th</sup> worst-traffic city in the world (TomTom International BV, 2019), which causes 65 trillion Rupiah in losses annually (Bappenas, 2019).

Based on the commuter statistics in the Jakarta Metropolitan Area (JMA), 72% of commuters use private vehicles, consisting of motorcycles (63%) and cars (9%). Only 20.4% of the JMA population uses public transport, while an insignificant amount (3.9%) uses ride-hailing. Ride-hailing is an app-based taxi service that consists of motorcycles and cars. Gojek and Grab are the most popular ride-hailing services in Indonesia, offering similar services to Uber. It is also rare (1.2%) to find citizens who utilize non-motorized transport (BPS, 2019b). These imbalanced mode shares among the population are responsible for the severe congestion in JMA.

Universities have a crucial role in urban and transport development because of their mixed land uses, with their vibrant built environment, making them one of the major trip generators (Tolley, 1996) for both students and workers. Wibowo *et al.* (2021) emphasize the importance

<sup>&</sup>lt;sup>1</sup> Pajajaran Street 111, Mediterania I, Sentul City, West Java, Indonesia, 16810 martina.cecilia@trisakti.ac.id

of universities as opportunities to measure regional accessibility. According to BPS Jakarta Province (2018), there are 320 universities in Jakarta Province, consisting of 5 state and 315 private universities. The total number of students is 677,335 and 615,236 in state and private universities respectively, representing around 12% of Jakarta's total population.

Limanond *et al.* (2011) stated that it is well known that university students have complex and unique travel behaviour, which differs from that of the general population. It is usually due to their irregular lecture schedules and their free time in the campus area, allowing them to participate in various activities on and off campus most of the day. Joewono *et al.* (2013) explored student activities and trips at several universities in Bandung and analyzed their characteristics, such as the number and length of trips per day, the number of activities, the activity duration, and trip cost. In addition, Khattak *et al.* (2011) stated that unusual travel behaviour of students was not well-understood in the analysis of travel demand.

The activities and flexibility of students' time affect their travel behaviour, including the transport mode choice for their travel to campus. In developed countries, students use more diverse transportation modes than the general population, which tend to be sustainable transport modes (Diana, 2008). A study on students at the University of North Carolina (Rodríguez and Joo, 2004) showed that 21.5%, 28.8%, and 49.6% travelled by public transportation, bicycle/walking, and car, respectively. Similar results were also found at the University of California Los Angeles (Zhou, 2012), where 30.9%, 24.8%, and 41.2% travelled by public transportation, bicycle/walking, and car, respectively. Further, Delmelle (2012) reported that walking is the most widely used mode of transportation at the University of Idaho, followed by cars and bicycles.

On the other hand, private vehicles are the most common mode used by students in developing countries, such as Indonesia. At Gadjah Mada University, Yogyakarta (Fauzi and Basuki, 2016), 68.64%, 7.63%, 5.51%, 11.02%, and 7.2% of students used motorcycles, cars, public transportation, walking, and bicycles as modes of travel, respectively. Primasari et al. (2013) stated that at Brawijaya University, Malang, mode use is dominated by motorcycles at 53.1%, followed by public transportation, walking, cars, and bicycles at 22.9%, 17.7%, 5.7%, and 0.5%, respectively. A study at the Indonesian Muslim University Makassar (Alkam and Said, 2018) showed that private vehicles are the most widely used mode, reaching 70.34%, followed by public transportation, online taxis, and walking at 13.81%, 11%, and 4.86%, respectively. All of those three studies reveal that in many Indonesian cities, motorcycles dominate students' choice of transport mode for commuting.

There is limited research on students' commuting behaviour in Jakarta and its influencing factors. Previous studies by Maulana and Yudhistira (2020) and Irjayanti *et al.* (2021) only analyzed the city's commuter behaviour for the general population. Therefore, this study aims to explore the mode choice of university students and understand the associated influential factors. Data were gathered from Universitas Trisakti as a case study. Universitas Trisakti is one of the largest private universities in Jakarta, located in a dense area of 23,980 people/km<sup>2</sup> (BPS Jakarta Barat, 2020).

Exploring students' transport modes of choice provides an idea of how their mobility influences the surrounding traffic. Moreover, understanding the basis of their mode choice is important for making transport strategies, policies, and plans in Jakarta. This study is expected to provide recommendations for universities with regard to improving the quality of the campus environment and for policymakers in terms of reducing the impact of students' mobility in the city.

#### BACKGROUND

Mode choice and its determinants among students have been explored in previous studies in both developed and developing countries (Khattak *et al.*, 2011; Limanond *et al.*, 2011; Delmelle and Delmelle, 2012; Zhou, 2012; Olawole and Olapoju, 2016; Moniruzzaman and Farber, 2018; Nguyen-Phuoc *et al.*, 2018; Krishnapriya and George, 2020).

A study by Limanond *et al.* (2011) on mode choice behaviour in a university in Thailand found that car ownership plays a significant role in students' transport mode choice, though it does not affect travel distance and trip number. Those who own a car are more likely to use it, while others select ridesharing or taking a bus. Furthermore, the authors found no distinct behaviour differences between genders in this study.

Another study by Delmelle and Delmelle (2012) found different factors affecting the choice of a car as a transport mode at Idaho University, United States. By analyzing spatial and temporal patterns, the authors discovered that parking permits are an essential factor for car commutes, specifically in the winter. Moreover, gender significantly influenced driving behaviour, with females being more likely to drive while males shift modes throughout the year.

A study of travel behaviour and student mode choice in the United States was also conducted by Zhou (2012) using data from the University of California (UCLA), located in Los Angeles, a car-dominated city. The intriguing results show that students did not have any tendency to drive alone more than their peers in other cities. The results showed that being multimodal and having a discounted transit pass increases the probability of using alternative modes, whereas holding parking permits raises the possibility of driving alone. Travel distance is positively associated with carpooling and telecommuting, while gender and status significantly affect cycling, walking, and public transport. Students living alone tend to drive alone, while those with peers living nearby tend to take public transport.

Moreover, a study in Toronto, Canada, by Moniruzzaman and Farber (2018) aimed to ascertain the determinants of sustainable mode choice among university students. The results showed that transit passes and bicycle ownership are essential in determining sustainable mode choices among students in Toronto. Furthermore, in terms of public transport use, a study by Tsioulianos *et al.* (2020) also found that university students in Greece are willing to walk further to/from bus stops than the standard 400 m maximum in the general public if supported by a higher frequency of bus services.

Studies on the ability of a residential location to affect mode choice (Khattak *et al.*, 2011; Olawole and Olapoju, 2016) revealed different behaviour between students living onand off-campus. Olawole and Olapoju (2016) found that in Nigeria, walking dominated the choice of on-campus students and buses were the main choice for those living away from the university building. Furthermore, gender, age, monthly stipend, travel distance, time, trip frequency, and cost significantly influenced the mode choice. Similar results on walking were also found in the study by Khattak *et al.* (2011). Students living on-campus tend to walk more and drive less due to their distinct demographic, since the majority of them are younger, unmarried, undergraduate, and full-time.

A study on mode choice behaviour in Kochi, India, by Krishnapriya and George (2020) revealed that students at all levels, including those in college, prefer public buses and two-wheelers. Gender also plays a significant role in mode choice, specifically for two-wheeler users. When travel cost is considered, buses are the most preferred mode. Residential characteristics also influence college students' mode choice, particularly with regard to the frequency of buses.

Nguyen-Phuoc *et al.* (2018) in Vietnam found that motorcycles dominate Vietnamese cities. Analyzing six universities, Nguyen-Phuoc found that age, gender, and income significantly affect student transport mode decisions. Moreover, travel time tends to decrease their desire to walk to campus. They found that motorcycle users are willing to switch to public transport when an efficient and reliable transport system is provided.

The above studies show that it is challenging to capture student behaviour with regard to transport mode choice in campus settings with various demographics and locations.

#### METHODOLOGY

#### Study area

Universitas Trisakti was selected to represent the universities in Jakarta. It is located in West Jakarta, Jakarta Province, with an area of 664.01 km<sup>2</sup> and a population of 10,556,810 (BPS Provinsi Jakarta, 2020). The campus is in a dense sub-district with a density of 23,980 people/km<sup>2</sup> (BPS Jakarta Barat, 2020).

According to the Ministry of Education and Culture (2021), Universitas Trisakti is one of the largest private universities in Jakarta, with a total of 20,913 students. Every year, 3,745 students enroll at the university, dominated by undergraduates (72.5%), masters students (11.4%), associates (8%), those studying for professional certification (3.4%), doctoral students (3.2%), and bachelor of applied science students (1.5%). However, it is important to note that the institution has experienced a downward trend in the number of students since 2020 due to the COVID-19 pandemic.

The entrance and exit gates of Universitas Trisakti are on Jalan Letjen S. Parman and Jalan Kyai Tapa, both arterial

roads, as shown in Figure 1. These two roads are known as congestion-prone spots in Jakarta according to the 2014 and 2017 Jakarta Open Data. The campus generates activities that play vital roles in regional traffic within the campus and its surroundings. Various types of public transportation, such as BRT TransJakarta, commuter line rail transport, conventional buses, and minibuses, are connected to the institution. The campus area also provides good pedestrian paths, but without surrounding bike lanes.

#### **Data collection**

This quantitative study was conducted with data collected from students through online questionnaires in February 2022. The questionnaire consisted of two sections: the socio-demographics of travellers and travel characteristics of Universitas Trisakti undergraduate students. The first section collected information on gender, monthly allowance, car and motorcycle ownership in the family, and ownership of a driving license. The second section collected information about the transport mode, distance to and from the university, travel time, travel cost, and the main reason for using a particular transport system.

The questionnaire included several question types, both nominal and scale forms. Due to the pandemic, the respondents were selected based on particular criteria. The population of this study is active undergraduate students at Universitas Trisakti who attended offline lectures before the pandemic, i.e., the classes of 2017-2019 only. Based on data from the Ministry of Research, Technology and Higher Education, the average number of annual students at Universitas Trisakti is 3,000; hence, the total population over three years is around 9,000. The number of samples was determined using the Slovin formula, which also adopts the random sampling method. For a  $\pm$  6% error margin and 94% confidence level, the minimum sample required is 270. After the survey process, data from 316 respondents were gathered, with only 275 students used for analysis after the checking and cleaning process.





Universitas Trisakti

#### Data analysis

Data were analyzed using statistical methods; prior to this process, descriptive statistics were conducted with frequency and crosstab. Frequency was employed to determine the mode choice, socio-economic, and travel characteristic proportions. Subsequently, data were analyzed with a crosstab to understand the distribution of socio-economic and travel characteristics among the five modes, i.e., walking, motorcycle, car, public transport, and ride-hailing.

The mode choice probability was determined using discrete choice modelling. Discrete choice models are usually used in transportation research to parameterize utility functions for the alternatives, based on revealed preferences and explanatory factors (Ben-Akiva and Lerman, 1985). Furthermore, multinomial logit regression was utilized to investigate the factors influencing the five transport mode choices among students. The multinomial logit model has been widely used for choice modelling because it gives the choice probabilities of each alternative as a function of the systematic portion of the utility of all the alternatives (Koppelman and Bhat, 2006). The analysis employed SPSS (Statistical Package for Social Science) software. The basic form of the multinomial logit model is given in Equation (1)

$$p = \frac{exp^{(a+b_1x_1+b_2x_2+b_3x_3...)}}{1+exp^{(a+b_1x_1+b_2x_2+b_3x_3...)}}$$
(1)

where p is the probability of the decision maker selecting a particular alternative, a is the constant value of the formula, and b is the coefficient value of the predictor variable.

#### **RESULTS AND DISCUSSION**

#### **Descriptive statistics**

Of the total 275 respondents in this study, 34.5% were male and 65.5% female students. Approximately 65.5% of the students had a monthly allowance of IDR <1,500,000, followed by 23.3% at IDR 1,500,001 – IDR 3,000,000, while the rest received > IDR 3,000,000. Moreover, the majority of students (82.9%) come from a family with 1 - 2 cars, and 89.1% have a motorcycle, while the remaining 10.9% have neither. Further, 54.2% and 52.7% of students have car and motorcycle driving licenses, respectively.

The results show that 40.4% of the students use public transport as their travel mode, which consists of the Commuter Line (KRL), TransJakarta, conventional buses, and minibuses. The second biggest share is private motorcycles (20.7%), followed by walking (17.5%), cars (12.7%), and ride-hailing (8.7%). Meanwhile, no student was found to cycle to campus (see Figure 2).

The results show that more than half of the students use public transport or walk (57.9%). It indicates that students, although in Jakarta, prefer to select sustainable transport modes, which differs from the general population. These findings align with a previous study stating that students have different travel behaviour and socio-demographics compared to the general population (Khattak *et al.*, 2011), since they tend to use public transport and non-motorized modes (Ripplinger and Brandt-Sargent, 2009). It occurs

Table 1. Characteristics of Respondents

Variables	N	Percentage (%)						
Gender								
Male	95	34.5						
Female	180	65.5						
Monthly Allowance (Indonesian Rupiah – IDR)*								
≤ IDR 500,000.00	67	24.4						
IDR 500,001 – IDR 1,000,000	68	24.7						
IDR 1,000,001 – IDR 1,500,000	45	16.4						
IDR 1,500,001 – IDR 2,000,000	27	9.8						
IDR 2,000,001 – IDR 2,500,000	19	6.9						
IDR 2,500,001 – IDR 3,000,000	18	6.5						
> IDR 3,000,000	31	11.2						
Car Ownership in Family								
0	47	17.1						
1 - 2	187	68						
3 - 4	26	9.5						
> 4	15	5.5						
Motorcycle Ownership in Family								
0	30	10.9						
1 - 2	182	66.2						
3 - 4	40	14.5						
> 4	23	8.4						
Car Driving License								
Yes	149	54.2						
No	126	45.8						
Motorcycle Driving License								
Yes	145	52.7						
No	130	47.3						

\*Average exchange rate in 2019: 1 USD = 14,136.4 IDR

because they usually comprise a younger and busier population group with relatively low income but who have more daily trips than the general population.



However, these results are contrary to the student mode choice in other Indonesian cities, where most prefer motorcycles to public transport (Primasari, *et al.*, 2013; Fauzi and Basuki, 2016; Alkam and Said, 2018). This occurs because Jakarta is the leader in public transport provision compared to other cities (Soehodho, 2017). The existence of effective public transportation gives students in Jakarta more alternatives for commuting to campus.

#### Gender influence on campus trip mode choice

The results show that public transport, walking, and private cars are popular among female students. Around 49.4% of female students use public transport as their main transport, while only 23.2% of male students choose it (see Figure 3). The different patterns show that male students tend to use motorcycles to get to campus (45.3%), while only a few female students use them (7.8%). This is contrary to previous studies, which found that male students in Asian countries prefer public transport over females for safety reasons (Zhang *et al.*, 2017; Dias *et al.*, 2022).

Figure 3. Mode share according to gender



Travel distance and trip mode choice

Figure 4 shows that students who walk are associated with short-distance travel, with 69.2% walking less than 1 km and 28.6% walking between 1-5 km. Meanwhile, public transport is mostly used for long-distance travel between 10–40 km (87.4%). Ride-hailing is common for shorter distances from 1-10 km, with around 70.8% of total ride-hailing users. Furthermore, motorcycle use is evenly distributed in all ranges of distances.

#### Monthly allowance and trip mode choice

The mode choice among students varies according to their monthly allowance, which reflects their socio-economic status. The use of public transport decreases as the allowance increases. Only a few students with a stipend between IDR 4,500,000 – IDR 5,000,000 use public transport (see Figure 5). On the other hand, the bigger the allowance, the higher the use of cars. Students who walk are evenly distributed in all ranges, with the biggest portion having an IDR 3,500,001 – IDR 4,000,000 stipend. Similar results were also shown by motorcycle users, where the majority is in all allowance ranges, except IDR 3,500,001 – IDR 4,500,000. Furthermore, ride-hailing was selected by those with an allowance of IDR 500,000 – IDR 3,500,000 and > 5 billion rupiahs.





Figure 5. Travel time and monthly allowance



#### Travel time and trip mode choice

Figure 6 shows that public transport has the biggest share of long travel time. Meanwhile, walking is associated with shorter travel time, particularly between 0 to 15 minutes (50.6%). Motorcycle users seem to be evenly distributed in all ranges. However, it has a decreasing trend as the travel time increases. Car users also vary in all levels, with the most common time within 60.1 - 75 minutes (27.6%). Students who use ride-hailing only have a short travel time, from 1 to 45 minutes maximum.



#### Weekly transport expenses and trip mode choice

Students of Universitas Trisakti also reported their weekly transport costs in this study. Those who walk pay mostly <IDR 50,000 (46%), IDR 100,000 – IDR 200,000, and even  $\geq$  IDR 500,000. The possible explanation for these findings is that the reported transport expenses are not only a home-campus trip but also other trips conducted in a week. Moreover, many car users tend to have higher transport expenses. Additionally, most public transport users spend up to IDR 349,999. This may be caused by the type of

Figure 7. Mode share and weekly transport expenses (IDR)



mode, travel distance, and the number of transfers. The distribution results also showed that the use of motorcycles costs less than public transport.

#### Reasons for choice of campus travel mode

Figure 8 summarizes the main reasons for selecting a transport mode. Public transport is chosen for various reasons, such as availability, ease of use, cost efficiency, and because it is congestion-free. Meanwhile, most car users are concerned about safety and comfort. Furthermore, some students prefer motorcycles due to the flexibility of travel to multiple destinations and time optimization because of their ability to avoid congestion.





#### Mode choice modelling

This study used five main modes of transport as dependent variables: walking, motorcycle, car, public transport, and ride-hailing. The multinomial logit modelling uses public transport as the reference category. The independent variables consist of gender, monthly allowance, vehicle ownership, driving license ownership, travel time, travel distance, and transport expenses. Before the modelling process, correlations between these independent variables were computed to avoid multicollinearity.

The variables in this study are statistically significant for improving the model compared to a null model, where AIC = 441.292 and -2 Log Likelihood = 361.292. Approximately 84.8% (Nagelkerke Pseudo R2) of the variability is explained by the variables used in the model, which means that the MNL model fits the sample data properly. Moreover, the Pearson chi-square is insignificant at 1.000, indicating that the model is well-fitted with the data.

Significant factors that influence the walking choice are student allowance, travel distance, travel time, and having a motorcycle driving license. Students with a higher allowance prefer walking to public transport at a 95% significance level. Travel distance is significant at a 99% level, whereby the further the distance, the less likely students are to choose to walk, preferring to use public transport. It is predictable because walking is only favourable for short-distance trips. Moreover, travel time also significantly affects walking choices (at a 90% significance level), which may be correlated with travel distance. Further, students who have motorcycle driving licenses prefer walking to public transport.

Some factors that significantly affect motorcycle use are gender, vehicle ownership, owning a driving license, travel distance, and travel time. The models show a notable difference in gender preference (99% significant) between motorcycles and public transport. Male students prefer to use motorcycles 12.229 times more than their female counterparts, who are more likely to select public transport. This result is in line with previous studies that stated motorcycles were the least preferred option for female students (Nguyen-Phuoc *et al.*, 2018; Krishnapriya and Soosan George, 2020). Further, most females in Jakarta, Kuala Lumpur, and Manila are less likely to select motorcycles (Ng and Acker, 2018).

Students with more motorcycles and licenses are more likely to ride to campus. These results align with previous studies showing that students owning motorcycles tend to use them (Nguyen-Phuoc *et al.*, 2018). It is common because some countries have motorcycle dependency due to socio-economic and habitual factors (Chang and Wu, 2008; Guillen *et al.*, 2013). The total number of cars owned are also correlated with motorcycle use, but only at a 90% significance level. Negative impact occurs with travel distance and travel time. The further the distance and the longer the travel time, the less likely students will commute by motorcycle.

Car users show different results when compared to public transport users. Students with more cars within their families and with licenses have a greater tendency to drive (OR = 7.627 and OR = 14.215, respectively). This finding aligns with the previous study by Limanond *et al.* (2011), showing that car ownership greatly influences students' tendency to drive. Also, positive regression was found between transport expenses and car usage.

Ride-hailing users show that allowance, transport expense, travel distance, and travel time impact their choice. The bigger their stipend, the greater the tendency to use ridehailing over public transport. Ride-hailing users are also associated with higher transport expenses. Therefore, the longer the distance and travel time, the less likely students are to choose ride-hailing over public transport.

Travel distance is negatively associated with walking, motorcycle use, and ride-hailing at 99%, 95%, and 95% significant levels, respectively. Students typically walk short distances because they find it uncomfortable to walk long distances, especially in humid cities. Studies have found that the walking distance preference in Jakarta is only between 500 to 700 meters (Afkara and Kusuma, 2020). Moreover, most Jakarta highways have high traffic volumes and high-speed limits. Motorcycle users are less likely to ride as the distance increases for reasons of safety. In fact, of the 109,215 traffic accidents in Indonesia, more than 70% are caused by motorcycles (BPS, 2019a). Furthermore, ride-hailing is related to progressive fares, which become more expensive as the distance increases (Irawan *et al.*, 2021a).

Travel time is a primary factor with regard to mode choice (Frank *et al.*, 2008). In this study, travel time is negatively associated with walking, motorcycle, and ride-hailing, indicating students are less likely to select those modes when faced with a longer travelling time. The possible

Variable	W	Walk Motor		rcycle Car		ar Ride		-hailing
	В	Exp[B]	В	Exp[B]	В	Exp[B]	В	Exp[B]
Intercept	7.888		-2.004		-6.039		2.169	
Gender [Male] <sup>1</sup>	0.162	0.038	2.504***	12.229	-0.913	0.401	0.226	1.254
Monthly Allowance	0.352**	1.422	-0.017	0.983	0.070	1.072	0.275**	1.317
Number of Cars	-0.735	0.479	0.736*	2.087	2.032***	7.627	0.051	1.053
Number of Motorcycles	-0.306	0.736	0.597*	1.818	-0.045	0.956	-0.381	0.683
Car Driving License[have] <sup>1</sup>	-0.211	0.810	0.628	1.874	2.654***	14.215	0.106	1.112
Motorcycle Driving License [Have] <sup>1</sup>	2.039**	7.680	1.542**	4.673	-1.215*	0.297	0.622	1.862
Travel Distance	-2.609***	0.074	-0.476**	0.621	-0.353	0.703	-0.646**	0.524
Travel Time	-1.243*	0.289	-0.582***	0.559	-0.282	0.755	-1.194***	0.303
Transport Expenses	0.019	1.020	0.090	1.095	0.467***	1.595	0.478***	1.613
Goodness of Fit Parameter	'S							
Ν				275				
Cox and Snell R <sup>2</sup> ; Nagelkerke R <sup>2</sup> ; McFadden R <sup>2</sup>				0.803; 0.848; 0.552				
-2LL (0); -2LL (ß); [X2; df; p-value]				808.358; 361.292 [447.066; 36; 0.000]				
AIC				441.292				
Pearson [X2: df: p-value]				[621,520: 1040: 1,000]				

Table 2. Multinominal logistic regression with public transport as reference

\*Significant at a level of 90%; \*\* Significant at a level of 95%; \*\*\* Significant at a level of 99%

explanation for this is that travel time could be related to travel distance.

Monthly allowance, which reflects socioeconomic status, is associated with ride-hailing and walking decisions. It is aligned with a previous study (Irawan *et al.*, 2021a) that found a tendency for higher-income students to use ride-hailing more. Students who walk seem not to be influenced by their economic condition, as shown in Figure 5. Conversely, students' monthly allowance does not significantly affect the use of private vehicles.

Irrespective of the most common use of public transport by students, cars and motorcycles also have a large share at 33.4%. Before 2021, parking in the campus area was free for students. Perhaps increasing the parking tariff will reduce private vehicle usage. Further studies need to be conducted to determine the optimal parking tariff. Improvements in public transport and walking facilities are required to enable students to shift to public transport and walk for long- and short-distance trips.

The bicycle facilities near the university should also be highlighted. This study found no students cycling to campus, which is possibly caused by the unsafe environment around the campus area. As stated, Universitas Trisakti is located on arterial roads with high volumes and high-speed vehicles without bicycle lanes. Building a safe and continuous bike lane in the surrounding campus area may increase bicycle use and help replace cars and motorcycles for short-distance trips.

During the 2020 COVID-19 pandemic, the government implemented a public activity restrictions (PPKM) policy to prevent the spread of the virus. This policy limited community-wide activities, which had a significant impact on mobility and travel behaviour. In Indonesia, a substantial reduction in travel was reported during the pandemic for all modes (Irawan *et al.*, 2021b; Maimunah *et al.*, 2022). Moreover, people's mode preferences also changed during the pandemic, significantly impacting public transport. A study in Jakarta reveals that transport modes shifted from previously public to private vehicles during the pandemic (Maimunah *et al.*, 2022). Moreover, those who still used public transport tended to choose ride-hailing, a more private form of public transport, compared to conventional public transport during the pandemic (Sjamsoeddin, 2021), since health protocol criteria became their main priority.

The Public Activity Restriction Policy (PPKM) for COVID-19 was officially lifted in December 2022, resulting in the return of all activities to their pre-pandemic patterns. However, the traffic is now dominated by private vehicles, while the passenger density on public transport is still below pre-pandemic levels. As of March 2023, the congestion index in the capital city has now exceeded 50%; later, it could approach or even exceed the 53% index from 2019 (Indraswari, 2023). Meanwhile, public transport passenger numbers have started recovering but have not reached prepandemic levels. MRT passenger numbers in early 2023 were still below the average of over 2.6 million people per month in 2019 (Annur, 2023). As for the commuter line, the average number of daily passengers in February 2023 was 743,242, which is still below the 1 million per day in 2019 (Yolandha, 2022).

University students who have returned to campus to continue their studies are also subject to the revocation of PPKM. Although there has still been a lack of new studies since the revocation, the increasing number of private vehicles and the decline of public transport use during the post-pandemic period may also reflect students' movements and mode preference changes in Jakarta. Although most students may use the same modes as before, there is still a chance that they will shift from public transport to other modes. Further study could be done to investigate students' post-pandemic transport mode choice and the probability of private vehicle use shifting toward more sustainable transport.

#### CONCLUSIONS

Understanding students' transport preferences and their influencing factors can help develop and enhance policies, programs, and infrastructure to create a better environment in the university areas and throughout Jakarta. Students should be encouraged to use more sustainable modes of commuting, such as public transport, walking, and cycling. This is because a decrease in private vehicle use would ease traffic congestion around university areas in Jakarta, thereby creating a better environment for students and the overall population. Data were gathered from Universitas Trisakti as a case study. This study found that living in Jakarta, a motorcycle and car-dominated city, students do not tend to use private vehicles like the majority of Jakarta's population and even their peers in other Indonesian cities. The transport modes used by students in this situation are dominated by public transport, followed by motorcycles, walking, cars, and ride-hailing. Many factors were found to influence students' decisions, such as gender, monthly allowance, the number of vehicles owned, having a driving license, travel distance, time, and weekly transport expenses. To promote more sustainable transport among students, policies and infrastructures need to be implemented, such as optimum parking fees within the campus area, improvement of public transport and walking facilities, and bicycle lanes. Hopefully, students will be able to contribute more to improving the campus environment and reducing Jakarta's traffic congestion.

#### Acknowledgements

This paper is a part of the research supported by Universitas Trisakti. The authors thank all parties who have participated in the research process. All statements and interpretations in this study are the authors' responsibility and only reflect the authors' view.

#### **ORCID**

Rahel Situmorang<sup>®</sup>https://orcid.org/0000-0003-3890-9300

#### REFERENCES

- Alkam, R. B., Said, L. B. (2018). Pemilihan Moda Transportasi Menuju Kampus Mahasiswa Universitas Muslim Indonesia, *Jurnal Transportasi*, Vol. 18, No. 3, pp. 201-210. https://doi. org/10.26593/jtrans.v18i3.3158.201-210
- Annur, C. M. (2023). Awal 2023, Jumlah Penumpang MRT Jakarta Belum Kembali Seperti Pra-Pandemi. Databoks. katadata [online]. https://databoks.katadata.co.id/ datapublish/2023/03/20/awal-2023-jumlah-penumpangmrt-jakarta-belum-kembali-seperti-pra-pandemi [Accessed: 27 Feb 2023].
- Avkara, A. V., Kusuma, A. (2020). Walking Distance Perception in Jakarta MRT Station Area. In F. T. Fang, L. S. Putranto, I. J. Prasitejo, S. Jaensisirisak (Eds.), *Proceedings of the 2nd International Symposium on Transportation Studies in*

*Developing Countries (ISTSDC 2019).* Atlantis Press, pp. 120-124. https://dx.doi.org/10.2991/aer.k.200220.025

- Bappenas (2019). *National Medium Term Development Plan* 2020 – 2024, Indonesian National Development Planning Board [online]. https://perpustakaan.bappenas.go.id/elibrary/file\_upload/koleksi/migrasi-data-publikasi/file/ RP\_RKP/Narasi-RPJMN-2020-2024-versi-Bahasa-Inggris.pdf [Accessed: 27 Feb 2023].
- Ben-Akiva, M., Lerman, S. R. (1985). *Discrete Choice Analysis: Theory and Applications to Travel Demand*. Cambridge, MA: The MIT Press.
- BPS (2019a). *Land transportation Statistics 2018*. Jakarta: Badan Pusat Statistik [online]. https://www.bps.go.id/ publication/2019/11/27/7fdd3379108b4a60e046f4c8/ statistik-transportasi-darat-2018.html [Accessed: 08 Jul 2022].
- BPS (2019b). *Statistik Komuter Jabodetabek 2019*, Jakarta: Badan Pusat Statistik [online]. https://www.bps.go.id/ publication/2019/12/04/eab87d14d99459f4016bb057/ statistik-komuter-jabodetabek-2019.html [Accessed: 26 May 2022].
- BPS Jakarta Barat (2020). Jakarta Barat Municipality in Figures 2020. Jakarta: Badan Pusat Statistik [online]. https://jakbarkota.bps.go.id/publication/2020/05/07/5d1208b4eaa1714c2c0a1ce5/kota-administrasi-jakarta-barat-dalam-angka-2020.html [Accessed: 26 May 2022].
- BPS Jakarta Province (2018). *DKI Jakarta Province in Figures 2018*, Jakarta: Badan Pusat Statistik Provinsi DKI Jakarta [online]. https://jakarta.bps.go.id/publication/2018/08/16/67d90391b7996f51d1c625c4/provinsi-dki-jakarta-dalam-angka-2018.html [Accessed: 27 May 2022].
- BPS Provinsi Jakarta (2020). *DKI Jakarta Province in Figures 2020*, Jakarta: Badan Pusat Statistik Provinsi DKI Jakarta [online]. https://jakarta.bps.go.id/publication/2020/04/27/20f5a58abcb80a0ad2a88725/provinsi-dki-jakarta-dalam-angka-2020.html [Accessed: 27 May 2022].
- Chang, H. L., Wu, S. C. (2008). Exploring the vehicle dependence behind mode choice: Evidence of motorcycle dependence in Taipei, *Transportation Research Part A: Policy and Practice*, Vol. 42, No. 2, pp. 307-320. https://doi.org/10.1016/j. tra.2007.10.005
- Delmelle, E. M., Delmelle, E. C. (2012). Exploring spatiotemporal commuting patterns in a university environment, *Transport Policy*, Vol. 21, pp. 1-9. https://doi.org/10.1016/j. tranpol.2011.12.007
- Diana, M. (2008). Making the "primary utility of travel" concept operational: A measurement model for the assessment of the intrinsic utility of reported trips, *Transportation Research Part A: Policy and Practice*, Vol. 42, No. 3, pp. 455-474. https://doi. org/10.1016/j.tra.2007.12.005
- Dias, C., Abdullah, M., Lovreglio, R., Sachchithanantham, S., Rekatheeban, M., Sathyaprasad, I. M. S. (2022). Exploring home-to-school trip mode choices in Kandy, Sri Lanka, *Journal of Transport Geography*, Vol. 99. https://doi.org/10.1016/j. jtrangeo.2022.103279
- Fauzi, I., Basuki, I. (2016). Pemilihan Moda Transportasi ke Kampus oleh Mahasiswa Universitas Gadjah Mada. In H. Setiawan, F. Raharjo, Siswadi (Eds.), *Konferensi Nasional Teknik Sipil 10*, Program Studi Teknik Sipil Fakultas Teknik Universitas

Atma Jaya Yogyakarta, pp. 457-466. http://e-journal. uajy.ac.id/28407/1/KONTEKS%2010-PEMILIHAN%20 MODA%20TRANSPORTASI.pdf

- Frank, L., Bradley, M., Kavage, S., Chapman, J., Lawton, T. K. (2008). Urban form, travel time, and cost relationships with tour complexity and mode choice, *Transportation*, Vol. 35, No. 1, pp. 37-54. https://doi.org/10.1007/s11116-007-9136-6
- Guillen, M. D., Ishida, H., Okamoto, N. (2013). Is the use of informal public transport modes in developing countries habitual? An empirical study in Davao City, Philippines, *Transport Policy*, Vol. 26, pp. 31-42. https://doi.org/10.1016/j. tranpol.2012.03.008
- Indraswari, D. L. (2023). Kemacetan di Jakarta yang Kian Sulit Dihindari. *Kompas* [online]. https://www.kompas.id/baca/ riset/2023/03/23/kemacetan-di-jakarta-yang-kian-sulitdihindari [Accessed: 24 Mar 2023].
- Irawan, M. Z., Bastarianto, F. F., Sugiarto, S., Amrozi, M. R. F. (2021a). Measuring the perceived need for motorcycle-based ride-hailing services on trip characteristics among university students in Yogyakarta, Indonesia, *Travel Behaviour and Society*, Vol. 24, pp. 303–312. https://doi.org/10.1016/j. tbs.2021.05.005
- Irawan, M. Z., Belgiawan, P. F., Joewono, T. B., Bastarianto, F. F., Rizki, M., Ilahi, A. (2021b). Exploring activity-travel behavior changes during the beginning of COVID-19 pandemic in Indonesia, *Transportation*, Vol. 11, pp. 1-25. https://doi. org/10.1007/s11116-021-10185-5
- Irjayanti, A. D., Sari, D. W., Rosida, I. (2021). Perilaku Pemilihan Moda Transportasi Pekerja Komuter: Studi Kasus Jabodetabek, *Jurnal Ekonomi dan Pembangunan Indonesia*, Vol. 21 No. 2, pp. 125-147. https://doi.org/10.21002/jepi.2021.09
- Jakarta Open Data (2014). *Titik Rawan Kemacetan Tahun 2014*. Jakarta Open Data [online]. https://data.jakarta.go.id/dataset/titik-rawan-kemacetan-di-dki-jakarta/resource / cf1250d7-f95c-4134-9ecb-b198999232a3 [Accessed: 25 Jun 2022].
- Jakarta Open Data (2017). *Data Titik Kemacetan di Jakarta Barat Tahun 2017*. Jakarta Open Data [online]. https://data.jakarta.go.id/dataset/data-titik-kemacetan-2017/resource/8736e4c4-7539-49a5-bc63-1077a69cf8d8 [Accessed: 25 Jun 2022].
- Joewono, T. B., Santoso, D. S., Hadi, P. L. (2013). Exploring University Students' Activities and Travels based on Travel Diary Report. In A. Fujiwara (Ed.), *The Eastern Asia Society for Transportation Studies – Conference Proceedings*, Vol. 9. http://www.easts.info/on-line/proceedings/vol9/PDF/P20. pdf
- Khattak, A., Wang, X., Son, S., Agnello, P. (2011). Travel by university students in Virginia: Is this travel different from travel by the general population?, *Transportation Research Record*, Vol. 2255, No. 1, pp. 137-145. https://doi. org/10.3141/2255-15
- Krishnapriya, M. G., George, T. S. (2020). Mode choice behaviour of students, integrating residential location characteristics: A study from Kochi City, India, *European Transport - Trasporti Europei*, No. 79, pp. 1-17. https://doi.org/10.48295/ ET.2020.79.5
- Limanond, T., Butsingkorn, T., Chermkhunthod, C. (2011). Travel behavior of university students who live on campus: A case study of a rural university in Asia, *Transport Policy*, Vol. 18, No. 1, pp. 163-171. https://doi.org/10.1016/j. tranpol.2010.07.006

- Maimunah, S., Rahmawati, A., Tsani, M. R. (2022). The Influence of The Covid-19 Pandemic on Mode Choice Preference in Jakarta, *RSF Conference Series: Engineering and Technology*, Vol. 2, No. 2, pp. 203-214. https://doi.org/10.31098/cset. v2i2.574
- Maulana, R., Yudhistira, M. H. (2020). Socio-Economic Factors Affecting the Choice of Transportation Mode in Jakarta Metropolitan Area, *Jurnal Pembangunan Wilayah dan Kota*, Vol. 16, No. 4, pp. 245-252. https://doi.org/10.14710/pwk. v16i4.32222
- Moniruzzaman, M., Farber, S. (2018). What drives sustainable student travel? Mode choice determinants in the Greater Toronto Area, *International Journal of Sustainable Transportation*, Vol. 12, No. 5, pp. 367-379. https://doi.org/10.1080/15568318.2017.1377326
- Ng, W. S., Acker, A. (2018). Understanding urban travel behaviour by gender for efficient and equitable transport policies, *International Transport Forum Discussion Papers*, No. 1, pp. 1-19. https://doi.org/10.1787/eaf64f94-en
- Nguyen-Phuoc, D. Q., Amoh-Gyimah, R., Tran, A. T. P., Phan, C. T. (2018). Mode choice among university students to school in Danang, Vietnam, *Travel Behaviour and Society*, Vol. 13, No. 1, pp. 1-10. https://doi.org/10.1016/j.tbs.2018.05.003
- Olawole, M. O. (2016). Mode choice of undergraduates: A case study of lecture trips in Nigeria, *The Indonesian Journal of Geography*, Vol. 48, No. 1, pp. 145-156. https://doi. org/10.22146/ijg.17630
- Primasari, D. W., Ernawati, J., Wicaksono, A. D. (2013). Pemilihan Moda Transportasi Ke Kampus Oleh Mahasiswa Universitas Brawijaya, *Indonesian Green Technology Journal*, Vol. 2, No. 2, pp. 84-93.
- Ripplinger, D., Hough, J., Brandt-Sargent, B. (2009). *The Changing Attitudes and Behaviors of University Students Toward Public Transportation*. (Final Report). Small Urban & Rural Transit Center Upper Great Plains Transportation Institute North Dakota State University Fargo, North Dakota [online]. https://www.ugpti.org/resources/reports/downloads/dp-222.pdf [Accessed: 04 Jun 2022].
- Rodríguez, D. A., Joo, J. (2004). The relationship between non-motorized mode choice and the local physical environment, *Transportation Research Part D: Transport and Environment*, Vol. 9, No. 2, pp. 151-173. https://doi.org/10.1016/j. trd.2003.11.001
- Sjamsoeddin, S. A. T. R. (2022). Analisis Pemilihan Moda Transportasi Umum Konvensional vs. Moda Transportasi Umum Online Pada Masa Pandemi Covid-19 Di Ibukota DKI Jakarta. (Doctoral dissertation, Universitas Bakrie, Indonesia). https://repository.bakrie.ac.id/6178/ [Accessed: 24 Mar 2023].
- Soehodho, S. (2017). Public transportation development and traffic accident prevention in Indonesia, *IATSS Research*, Vol. 40, No. 2, pp. 76-80. https://doi.org/10.1016/j. iatssr.2016.05.001
- Tolley, R. (1996). Green campuses: cutting the environmental cost of commuting, *Journal of Transport Geography*, Vol. 4, No. 3, pp. 213-217. https://doi.org/10.1016/0966-6923(96)00022-1
- TomTom International BV (2019). *Traffic Index 2019*, TomTom International BV [online]. https://nonews.co/wp-content/uploads/2020/02/TomTom2019.pdf [Accessed: 21 May 2022].

- Tsioulianos, C., Basbas, S., Georgiadis, G. (2020). How do passenger and trip attributes affect walking distances to bus public transport stops? Evidence from university students in Greece, *Spatium*, No. 44, pp. 12-21. https://doi.org/10.2298/SPAT2044012T
- Wibowo, B. S., Aditya, R. B., Harianto, T. F. (2021). Harnessing open data and technology for the study of accessibility: The case of Indonesia's capital site candidate, *Spatium*, No. 46, pp. 46-53. https://doi.org/10.2298/SPAT2146046W
- Yolandha, F. (2022). KAI Commuter Catat Rekor Peningkatan Jumlah Penumpang KRL. *Republika* [online]. https://news. republika.co.id/berita/rel85n370/kai-commuter-catatrekor-peningkatan-jumlah-penumpang-krl [Accessed: 24 Mar 2023].
- Zhang, R., Yao, E., Liu, Z. (2017). School travel mode choice in Beijing, China, *Journal of Transport Geography*, Vol. 62, pp. 98-110. https://doi.org/10.1016/j.jtrangeo.2017.06.001
- Zhou, J. (2012). Sustainable commute in a car-dominant city: Factors affecting alternative mode choices among university students, *Transportation Research Part A: Policy and Practice,* Vol. 46, No. 7, pp. 1013-1029. https://doi.org/10.1016/j. tra.2012.04.001

Received February 2023; accepted in revised form April 2023. First published: 30 May 2023.

# *by* Martina Adriana

Submission date: 25-Aug-2022 12:38PM (UTC+0700) Submission ID: 1886765453 File name: Manuscript\_Martina\_Cecilia\_Adriana.docx (1.83M) Word count: 5444 Character count: 30841



#### Abstract

University students' unique and complex travel behavior makes it challenging to capture due to various demographic and location, which is responsible for Jakarta's traffic. Therefore, this study explored the mode choice and contributing factors affecting the travel behavior of Universitas Trisakti students. The result showed that despite living in Jakarta, a motorcycle and car-dominated city, students don't use private vehicles like Jakarta population and their peers in other Indonesian cities. Students in Jakarta prefer public transport and then followed by motorcycle, walking, car, ridehailing, and yet no biking. Some factors that significantly affected their decision mode were gender, monthly allowance, number of cars and motorcycles, driving license, travel distance, travel time, and weekly transport cost. In conclusion, policies and infrastructure, such as parking fees, bike lanes, as well as better public transport and walking facilities, are needed to ease traffic and create a better campus environment.

Keywords: Mode Choice, University Students, Logit Model, Universitas Trisakti, Jakarta

#### 1. Introduction

Jakarta, the capital city of Indonesia, is the centre of economy, politics, and culture, hence, it serves the surrounding metropolitan area called Jabodetabek. As the densest city in Indonesia, it faces numerous urban problems, such as air and noise pollution, greenhouse gas emission, traffic accidents, as well as noise pollution. In 2019, this city was ranked as the 7<sup>th</sup> worst traffic city in the world (Tomtom, 2019), which causes losses worth 65 trillion Rupiah yearly (Bappenas, **5**19).

Generally, congestion occurs due to the high number of vehicles on the road and based on the commuter statistic in Jakarta Metropolitan Area (JMA), private vehicles dominate the mode by 72%, while motorcycles and car users are 63% and 9%. Only 20.4% of the JMA population uses public transport, while an insignificant amount of 3.9% uses ride-hailing. It is also rare to find citizens who utilize non-motorized transport (1.2%) (BPS, 2019). These imbalance mode shares among the population are responsible for the severe congestion in JMA.

<sup>\*</sup> Corresponding author: Martina Cecilia Adriana (martina.cecilia@trisakti.ac.id)

University is a major sector that generates various road trips (Tolley, 1996), both for students and workers. According to BPS Jakarta Province (2018), there are 320 universities in DKI, consisting of 5 state and 315 private universities. The total number of students is 677.335 and 615.236 in state and private universities, respectively, about 12% of the population.

Limanond, Butsingkorn and Chermkhunthod (2011) stated that university students are well known to have complex and unique travel behavior, which differ from the general population. This is usually due to the irregular lecture schedules and the need to be in the campus area to participate in various on-campus and off-campus activities. Joewono *et al.* (2013) explored student activities and trips at several universes in Bandung and found different characteristics, such as the number and length of trips per day, the number of activities, duration, and cost. However, Khattak *et al.* (2011) stated that unusual behavior by students was not well understood in the analysis of travel demand.

The activities and flexibility of students' time affect their travel behavior, including the choice of mode to campus. In developed countries, students use more divers transportation modes than the general population (Diana, 2008). Study on students at the University of North Carolina (Rodríguez and Joo, 2004) showed that 21.5 28.8%, and 49.6% used public transportation, bicycle/walking, and car, respectively. Similar results were also found at the University of California Los Angeles (Zhou, 2012), where 30.9%, 24.8%, and 41.2% used public cansportation, bicycle/walking, and car, respectively. Delmelle (2012) reported that walking is the most widely used mode of transportation at the University of Idaho, followed by cars and bicycles.

On the contrary, private vehicles are the most common mode that students use in developing countries, such as Indonesia. At Gadjah Mada University, Yogyakarta (Fauzi and Basuki, 2016), 68.64%, 7.63%, 5.51%, 11.02%, and 7.2% of students used motorcycles, cars, public transportation, walking, and bicycles as a mode of movement, respectively. Primasari, Ernawati, and W (2013) stated that at Brawijaya University, Malang, mode use is dominated by motorcycles at 53.1%, followed by public transportation, walking, cars, and bicycles at 22.9%, 17.7%, 5.7%, and 0.5%, respectively. Literature at the Indonesian Muslim University Makassar (Alkam and Said, 2018) showed that private vehicles are the most widely used mode, reaching 70.34%, followed by public transportation, online taxis, and walking at 13.81%, 11%, and 4.86%, respectively. Based on this study, it can be seen that in many Indonesian cities, motorcycle dominates the choice of students' mode of commuting.

Overall, there is limited study on students' commute behavior in Jakarta and its influencing factors. Preliminary studies by Maulana and Yudhistira (2020) and Irjayanti, Siri and Rosida (2021) only analyzed the city's commuter behavior as a whole. Therefore, this study aims to explore the mode choice of students and understand the associated influential factors. Data were collected from Universitas Trisakti, one of the largest private universities in West Jakarta which is located in a dense area of 23,980 people/km<sup>2</sup> (BPS Jakarta Barat, 2020).

Exploring students' mode of choice provides an idea of how their mobility influences surrounding traffic. Moreover, understanding the basis of mode choice is important for making transport strategies, policies, and plans in Jakarta. This study is expected to be a recommendation for universities to improve (se quality of the campus environment and provide recommendations for policy-makers to reduce the impact of students' mobility in the city.

#### 2. Background

Mode choice and its determinants among students hore been explored in preliminary studies in both developed and developing countries (Khattak *et al.*, 2011; Limanond, Butsingkorn, and Chergkhunthod, 2011; Delmelle and Delmelle, 2012; Zhou, 2012; Olawole and Olapoju, 2016; Moniruzzaman and Farber, 2018; Nguyen-Phuoc *et al.*, 2018; Krishnapriya and Soosan George, 2020).

The study by Limanond, Butsingkorn, and Chermkhunthod (2011) on mode choice behavior using a university in Thailand found that car ownership plays a significant role thought does not affect travel distance and trip number. Those, who own a car, are more likely to use it, while others select ridesharing or taking a bus. Furthermore, there is no distinct behavior between genders found in this study.

Another study by Delmelle and Delmelle (2012) found different factors affecting the car choice mode at Idaho University, United States. By analyzing spatial and temporal patterns, they found that parking permit is a key factor for commuting by cars, specifically in the winter. Moreover, genders significantly influence driving behavior, wight females more likely to drive while males shift modes in the year.

A study of travel behavior and mode choice of stearns in the United States was also conducted by Zhou (2012). Data were collected from the University of Castornia, located in Los Angeles (UCLA), one of the car-dominated cities. Interestingly, students drive alone more than their peers in other cities. Being multimodal and having discounted transit pass increases the probability of other modes, whereas holding parking permits raises the possibility of driving alone. Travel distance is positively associated with carpooling and telecommuting, while gender and status significantly affect biking, walking, and public transport. Students living alone tend to drive alone, while those with peers living nearby take public transport.

Moreover, the study in Toronto, Canada, by Moniruzzaman and Farber (2018) aimed to answer the determinants of sustainable mode choice among students. <sup>127</sup> results showed that transit pass and bike ownership are essential in determining sustainable mode choices among students in the region.

Studies on the ability of a residential location to affect mode hoice (Khattak *et al.*, 2011; Olawole and Olapoju, 2016) revealed different behavior between students living on- and off-campus. Olawole and Olapoju (2016) found that in Nigeria, walking dominated the choice of on-campus students and buses for those leaving outside the university premises. Furthermore, gender, age, monthly stipend, travel distance, time, trip frequency, and cost significantly influence the mode choice comminate students living on-walking were also found in the study by Khattak *et al.* (2011). Students living on-campus tend the the mode and drive less due to their distinct demographic, where the majority are younger, un-married, undergraduate, and full-time.

The study on mode choice behavior in Kochi, India, by Krishnapriya and S2osan George (2020) revealed that all levels of students, including those in college, prefer public buses and two-wheeler. Gender also plays a 2gnificant role in mode choice, specifically for two-wheeler users, with the bus as the most preferred mode when travel cost is considered. Residential characteristics also influence college students' mode choice, particularly on the frequency of buses.

Nguyen-Phuoc *et al.* (2018) in Vietnam found that mot zzycles dominate the city. Analyzing six universities, Nguyen-Phuoc found that age, gender, and income significantly affect student mode decisions. Moreover, travel time tends to decline their

choice to walk to campus. Motorcycle users are willing to switch to public transport when an efficient and reliable system is provided.

The previous literatures lead to the assertion that in campus settings, with various demographics and locations, it is challenging to capture students' mode choice behaviors.



3.1 Study Area

**20** The study area is Universitas Trisakti, located in West Jakarta City, Jakarta Province, with an area of 664.01 Km<sup>2</sup> and a population of 10.556.810 (BPS Provinsi Jakarta, 2020). The campus is in a dense sub-district area with a density of 23.980 people/km<sup>2</sup> (BPS Jakarta Barat, 2020).

According to the Ministry of Education and Culture (2021), Universitas Trisakti is one of the largest private universities in Jakarta, with a total of 20,913 students. Every year, 3,745 people enrol into the university, which are dominated by undergraduate students (72.5%), masters (11.4%), D3 (8%), Profession (3.4%), S3 (3.2%), and D4 (1.5%). However, it is important to note that the institution has experienced a downward trend in the number of students since 2020 due to the Covid-19 pandemic.

The entrance and exit gates of Universitas Trisakti are on Jalan Letjen S. Parman and Jalan Kyai Tapa, both arterial roads, as shown in Figure 1. These two roads are listed as congestion-prone points in Jakarta according to the 2014 and 2017 Open Data. The campus generates activities that play vital roles in regional traffic within the campus and its surroundings. Various types of public transportation, such as BRT TransJakarta, commuter line rail transport, conventional, and minibuses pass through the institution. The campus area also provides good pedestrian paths but without surrounding bike lanes.

#### 3.2 Data Collection

This quantitative study was conducted with data collected from students through questionnaire in February 2022. The questionnaire consisted of two sections to determine the socio-dengraphic of travellers and travel characteristics by Universitas Trisakti undergraduate students. The first section collected information on gender, monthly allowance, car and motorcycle ownership in the family, and driving license. The second section contains information about the mode of travel, distance to and from the university, travel time, cost, and the main reason for using a particular transport system.

The questionnaire consists of several question types, both in the form of nominal choices and a scale. Due to the pandemic, the respondents were selected based on particular criteria. The population of this study is active undergraduate students at Universitas Trisakti who have attended of a ne lectures before the pandemic class of 2017 to 2019 only. Based on data from the Ministry of Research, Technology and Higher Education, the average annual students at Universitas 28 isakti are 3000, hence, the total population in three years is around 9000. The number of samples was estermined using the Slovin formula, which also adopts the random sampling method. For a  $\pm 6\%$  error margin and 94% confidence level, the minimum sample required is

270. After the survey process, 316 respondents' data were gathered, with only 275 students used for analysis after the checking and cleaning process.



Figure 1: Jakarta Province and Location of Universitas Trisakti Source: Google Maps

#### 3.3 Data Analysis

Data were analyzed using statistical methods, and prior to this process, the descriptive statistics were used to evaluate the frequency and crosstab. Frequency was employed to determine the mode choice, socio-economic, and travel characteristic proportions. Subsequently, the analysis was continued with a crosstab to understand the distribution of socio-economic and travel characteristics to the five-mode choices, namely walking, motorcycle, car, public transport, and ride-hailing.

Determination **G** mode choice probability was conducted with discrete choice modeling, usually used in transportation study to parameterize utility functions for the alternatives based on revealed preferences and explanatory factors (Ben-Akiva and Lerman, 1985). Furthermore, multinominal logit regression in **2** stigates the factors influencing the five student's mode choices. The multinominal logit model has been widely used for choice modeling because it gives the choice probabilities of each alternative as a function of the systematic portion of the utility of all the alternatives (Koppelman and Bhat, 2006). **2** he analysis employed SPSS (Statistical Package for Social Science) software, while the basic form of the multinominal logit model is given in Equation (1).

$$p = \frac{exp^{(a+b_1x_1+b_2x_2+b_3x_3...)}}{1+exp^{(a+b_1x_1+b_2x_2+b_3x_3...)}}$$
(1)

Where p is the probability of the decision maker selecting a particular alternation, a is the constant value of the formula, and b is the coefficient value of the predictor variable.

#### 4. Results and Discussion

#### 4.1 Descriptive Statistics

Of the total 275 respondents in this study, 34.5% and 65.5% are male and female students, respectively. Approximately 65.5% of students had 17 monthly allowance between  $\leq$  IDR 500,000 - IDR 1,500,000 followed by 23.3% at IDR 1.500.001 – IDR 3.000.000, while the rest is > IDR 3.000.000. The allowance reflects students' economic status, where 82.9% come from a family with 1 to 2 cars, 89.1% have a motorcycle, and the remaining 10.9% own none. Moreover, 54.2% and 52.7% of students have car and motorcycle driving licenses, respectively.

#### Table 1: Characteristics of Respondents

Variables	N	Percentage (%)
Gender		
Male	95	34.5
Female	180	65.5
M10thly Allowance		
$\leq$ IDR 500.000,00	67	24.4
IDR 500.001 – IDR 1.002,000	68	24.7
IDR 1.000.001 – IDR 1.500.000	45	16.4
Rp1.500.001 - Rp2.000.000	27	9.8
Rp2.000.001 - Rp2.500.000	19	6.9
Rp2.500.001 - Rp3.000.000	18	6.5
Rp3.000.001 - Rp3.500.000	5	1.8
Rp3.500.001 - Rp4.000.000	5	1.8
Rp4.000.001 - Rp4.500.000	3	1.1
Rp4.500.001 - Rp5.000.000	3	1.8
> Rp5.000.000,00	13	4.7
Car Ownership in Family		
0	47	17.1
1 - 2	187	68
3 - 4	26	9.5
>4	15	5.5
Motorcycle Ownership in Family		
0	30	10.9
1 - 2	182	66.2
3 - 4	40	14.5
> 4 34	23	8.4
Car Driving License		
Yes	149	54.2
No	126	45.8
Motorcycle Driving License		
Yes	145	52.7
No	130	47.3

Studies have shown that 40.4% of the students use public transport as their main travel mode, which consists of Commuter Line (KRL), TransJakarta conventional bus, and minibus. Others include walking, using cars, and ride-hailing in percentages of

20.7%, 17.5%, 12.7, and 8.7%. Meanwhile, no student is found to bike campus (see Figure 32

The results showed that more than half of the students use public transport and walking (57.9%). This indices that students, even those in Jakarta, tend to select settimate transport, which differs from the mode choice of the general population. Khattak *et al.* (2011), stating that students have differed travel behavior and socio-demographics compared to the general population, who use public transport and non-motorized modes (Ripplinger and Brandt-s gent, 2009). Khattak *et al.* (2011) stated that the reason is that they usually comprise a younger and busier population group with relatively low incomes, but have more daily trips.



Figure 2: Mode Choice of Universitas Trisakti's Student

However, these results are contrary to students' mode choice in other Indonesian cities, where most prefer motorcycles to public transport (Primasari, Ernawati, and W, 2013; Fauzi and Basuki, 2016; Alkam and Said, 2018). This occurs because Jakarta is the leader in public transport provision compared to other cities (Soehodho, 2017). The existence of effective public transportation gives alternatives for students in Jakarta to commute to campus.

#### 4.2 Gender Influence on Campus Trip Mode Choice

Around 49.4% of female students use public transport as their main means of transport, which is less than male who contain only 23.2% (see Figure 3). The different patterns found that 45.3% and 7.8% of male and female students use a motorcycle to campus. This is contrary to previous studies, which found that male students in Asian Countries prefer public transport over female due to safety reasons (Zhang, Yao, and Liu, 2017; Dias *et al.*, 2022).

#### 4.3 Travel Distance and Trip Mode Choice

According to Figure 4, the walking distance between <1 km and 1-5 km is 69.2% and 28.6% respectively. Meanwhile, public transport is most common in the further distance from 10-40 Km (87.4%). Ride-hailing is common for shorter distances from 1-10 Km, with around 70.8% of total ride-hailing users. Furthermore, motorcycle use is almost evenly distributed in all ranges of distance.







Figure 4: Mode Share by Travel Distance

#### 4.4 Monthly Allowance and Trip Mode Choice

The mode choice among students varies according to their monthly allowance, which reflects their socio-economic status. The use of public transport decreases as allowance increases, because only a few students possess IDR 4.500.000 - 5.000.00. On the other hand, the bigger the allowance, the higher the use of cars. Students who walk are evenly distributed in all ranges, with the biggest portion having IDR 3.500.001 - IDR 4.000.000 stipend. Similar results were also shown by motorcycle users, where the majority is in all allowance ranges, except IDR 3.500.001 - IDR 4.500.000. Furthermore, ride-hailing was selected by those with allowance betwen IDR 500.000 - IDR 3.500.000 and > 5 billion rupiahs.

#### 8



4.5 Travel Time and Trip Mode Choice

Figure 5 shows that public transport has the biggest share for long travel time. Meanwhile, walking is associated with shorter travel time, particularly between 0 to 15 minutes (50.6%). Motorcycle users seem to be evenly distributed in all ranges, with a decrease in the trend of shares as the travel time inclines. Car users also vary in all levels, with the most common time within 60.1 - 75 minutes (27.6%). Students who use ride-hailing only spend short travel time, between 0.1 to 45 minutes maximum.



Figure 6: Mode Share and Travel Time

#### 4.6 Weekly Transport Expenses and Trip Mode Choice

Students of Universitas Trisakti also reported their weekly transport costs in this study. Those who walk pay mostly < IDR 50.000 (46%), 100.000 – IDR 200.000, and even  $\geq$  500.000. The possible explanation for these findings is that the reported transport expenses are not only a home-campus trip but also other trips conducted in a week. Moreover, many car users tend to have higher transport expenses. Public transport users spend more vary from < IDR 50.000 to 349.999 due to their mode type, travel distance, and the number of transfers. The distribution results also showed that motorcycle users cost less than public transport users.

9



Figure 7: Mode Share and Weekly Transport Expenses

4.7 Main Reason to Select Campus Travel Mode

Figure 8 summarises the main reasons to select a commute mode. Public transport is selected for various reasons, such as availability, ease to use, efficient cost, congestion-free. Meanwhile, most car users are concerned about safety and comfort. Furthermore, students prefer motorcycles due to the flexibility to multiple destinations and time optimization by its ability to avoid congestion.



Figure 8: Mode Share and Main Reason to Use Transport Mode

#### 4.8 Mode Choice Modelling

This study used five main modes as dependent variables, namely walking, motorcycle, car, public transport, and ride-hailing. The multinominal logit modeling was conducted using public transport as the reference category. The independent variables include gender, monthly allowance, vehicle ownership, driving license, travel time, distance, and transport expenses. Prior to the modeling process, correlations between those independent variables were computed to avoid multicollinearity.

The variables in this study are statistically significant in improving the model compared to a null model, where AIC = 441.292 and -2 Log Likelihood = 361.292. Approximately 84.8% (Nagelkerke Pseudo  $R^2$ ) of the variability is explained by the variables used in the model, hence, it can e concluded that the MNL model fits the

sample data properly. Moreover, the Pearson chi-square is insignificant at 1.000, indicating that the model is well-fitted with the data.

Statistical significant regression has been found between student allowance, travel distance, travel time, and motorcycle driving license ownership with walking choice. Students with a higher allowance prefer walking to public transport at a 95% significant level. Travel distance is significant at 99%, where the longer the distance, the less likely their ability to walk than using public transport. This is predictable because walking is only favorable for short-distance trips. Moreover, travel time is also significantly affected with 90% of walking choices, which is correlated with travel distance. Students who have motorcycle driving licenses prefer walking to using public transport.

Some factors that significantly affect motorcycle use are gender, vehicle ownership, driving license, travel distance, and travel time. The models show a significant difference in gender preference at 99% significant between the motorcycle and public transport. Male students tend to use motorcycles 12.229 times more their female counterpart, who are more likely to select public transport as their reference category. Preliminary studies by Nguyen-Phuoc et al. (2018) and Krishnapriya and Soosan George (2020) stated that the least prefered means of transportation by female students' is motorcycles. Furhter, most females in Jakarta, Kuala Lumpur, and Manilla are less likely to select motorcycles (Ng and Acker, 2018). Students with more motorcycles and licenses in their families are more likely to ride to campus. Nguyen-Phuoc et al. (2018) stated that it is not surprising for students owning a motorcycle to use it in universities. This is common because some countries have motorcycle dependency due to socioeconomic and habitual factors (Chang and Wu, 2008; Guillen, Ishida, and Okamoto, 2013). Total cars owned also correlate with motorcycle use but only at a 90% significant level. Negative impact occurs with travel distance and travel time. The further the distance and the longer the time, the less likely students will commute by motorcycle.

The car users show quite distinct results when compared to public transport users. Students with more cars within their families and who have licenses are highly significant influencing students to drive (OR = 7.627 and OR = 14.215, respectively). This is in line with the previous study by Limanond, Butsingkorn, and Chermkhunthod (2011) that car ownership influences usage among students. Also, positive regression is found between transport expenses and car usage.

Ride-hailing users show that students' allowance, transport expense, travel distance, and travel time impact their choice. The bigger their allowance, the greater the tendency to use ride-hailing over public transport. Ride-hailing users are also associated with higher transport expenses. Therefore, the longer the distance and travel time, the less likely students are to choose ride-hailing over public transport.

	12 Wa	ılk	Motor	cycle	Са	ır	Ride-hailing	
Variable	В	Exp[B]	В	Exp[B]	В	Exp[B]	В	Exp[B]
Intercept	7.888		-2.004		-6.039		2.169	
Gender[Male]1	0.162	0.038	2.504***	12.229	-0.913	0.401	0.226	1.254
Monthly Allowance	0.352**	1.422	-0.017	0.983	0.070	1.072	0.275**	1.317
Number of Cars	-0.735	0.479	0.736*	2.087	2.032***	7.627	0.051	1.053
Number of Motorcycles	-0.306	0.736	0.597*	1.818	-0.045	0.956	-0.381	0.683
Car Driving License[have]1	-0.211	0.810	0.628	1.874	2.654***	14.215	0.106	1.112
Motorcycle Driving License[Have] <sup>1</sup>	2.039**	7.680	1.542**	4.673	-1.215*	0.297	0.622	1.862
Travel Distance	-2.609***	0.074	-0.476**	0.621	-0.353	0.703	-0.646**	0.524
Travel Time	-1.243*	0.289	-0.582***	0.559	-0.282	0.755	-1.194***	0.303
Transport Expenses	0.019	1.020	0.090	1.095	0.467***	1.595	0.478***	1.613
Goodness of Fit Parameters 275   N 275   Cox and Snell R <sup>2</sup> ; Nagelkerke R <sup>2</sup> ; McFadden R <sup>2</sup> 0.803; 0.848; 0.552   -2LL (0); -2LL (B); [X2; df; p-value] 808.358; 361.292   [447.066; 36; 0.000] [447.066; 36; 0.000]   AIC 441.292   Person [X2; df; p-value] [621.520: 1040: 1.000]								
*Significant at	a laval of 00	0. ** C:~	rificant at a l	aval of 05	0. *** Cim	ficent et e	lavel of 000	/
*Significant at a level of 90%; ** Significant at a level of 95%; *** Significant at a level of 99%								

Tabla	1.	Multinominal	Logistia	Degradian	with Dublic	Transport of	Deference
rable	1.	Multinonninai	LOgistic	Regression	with Public	Transport as	Reference

Travel distance is negatively associated with walking, motorcycle, and ride-hailing at 99%, 95%, and 95% significant levels, respectively. The reason for walking is usually for the short-distance trip because long distance makes people uncomfortable due to the city's humid nature. Studies found that walking distance preference in Jakarta is only between 500 to 700 meters (Afkara and Kusuma, 2020). Moreover, most Jakarta highway contains increased traffic volumes and high-speed limits. Motorcycle users are less likely to ride as the distance increase due to safety reasons. In fact, of the 109.215 traffic accidents in Indonesia, more than 70% are caused by motorcycles (Ministry of Transportation of Republic Indonesia, 2019). Furthermore, ride-hailing is related to progressive fare, which becomes more expensive as the distance increases (Zudhy *et al.*, 2021).

Travel time is mainly a major factor in mode choice (Frank *et al.*, 2008). In this study, travel time is networking associated with walking, motorcycle, and ride-hailing, indicating students are less likely to select those modes due to longer traveling time. The possible explanation for this that travel time could be related to the travel distance.

Monthly allowance, which reflects their socioeconomic status, is associated with ride-hailing and walking. Zudhy *et al.* (2021) stated that there is a tendency for students with higher income to use ride-hailing more. Students who walk seem not to be influenced by their economic condition, as showned figure 5. Conversely, students monthly allowance does not significantly affect the use of private vehicles.

Irrespective of the common use of public transport by students, cars and motorcycles also have quite a big share at 33.4%. Before 2021, parking in the campus area was free for students. Hopefully, by increasing the parking tariff will probably reduce the private vehicles use among students. Further studies need to be conducted to determine the optimum tariff. Improvements in public transport and walking facilities are needed to enable students to shift to public transport and walk for long and short-distance trips.

The highlight should also be given to the bike facilities around the university area. This study found no students biking to campus which could possibly cause by the unsafe environment around Universitas Trisakti area. As stated, Universitas Trisatkti is located on arterial roads with high volumes and high-speed vehicles without any bicycle lanes. Building a safe and continuous bike lane in the surrounding campus area may increase bike use and replace car and motorcycle use for short-distance trips. Further study could be done to investigate the shifting probability of private vehicle users toward more sustainable transport.

#### 5. Conclusion

3

Understanding students' mode choice and its factors can help Universities and the government to develop and improve policies, programs, and infrastructure to create a better environments in university areas and Jakarta in general. Students should be promoted to use more sustainable modes of commuting, such as public transport, walking, and cycling. This is because the decrease in private vehicle use will ease traffic congestion around university areas in Jakarta, thereby creating a better environment for students and the overall population. Data were collected from Universitas Trisakti's students living in Jakarta, a motorcycle and car-dominated city. This study found that living in Jakarta, students don't use private vehicles like Jakarta population and even their peers in other Indonesian cities. The transport modes used by students in this situation are dominated by public transport, followed by motorcycle, walking, car, and ride-hailing. Many factors are found to be the influencer of students' decisions, such as gender, monthly allowance, number of cars and motorcycles, driving license, travel distance, time, and weekly transport expenses. To promote more sustainable transport among students, policies and infrastructures need to be implemented, such as parking fees within the campus area, improvement of public transport and walking facilities, and bike lanes. It is expected that students can create a better campus environment and ease traffic congestion in Jakarta.

#### References

- Afkara, A.V. and Kusuma, A. (2020) "Walking Distance Perception in Jakarta MRT Station Area\*", in: *Proceedings of the 2nd International Symposium on Transportation Studies in Developing Countries (ISTSDC 2019)*, pp. 120–124.
- Alkam, R.B. and Said, L.B. (2018) "Pemilihan Moda Transportasi Menuju Kampus Mahasiswa Universitas Muslim Indonesia", *Jurnal Transportasi*, 18(3), pp. 201–210.
- Bappenas (2019) "National Medium Term Development Plan 2020 2024", Indonesian National Development Planning Board [Preprint], (18).
- Ben-Akiva, M. and Lerman, S.R. (1985) *Discrete Choice Analysis: Theory and Applications to Travel Demand*. 9th edn. The MIT Press.

BPS (2019) Statistik Komuter Jabodetabek 2019, Badan Pusat Statistik.

- BPS Jakarta Barat (2020) Jakarta Barat Municipality in Figures 2020.
- BPS Jakarta Province (2018) DKI Jakarta Province in Figures 2018.
- BPS Provinsi Jakarta (2020) "Jakarta in Figure of Year 2020', p. 798.
- Chang, H.L. and Wu, S.C. (2008) "Exploring the vehicle dependence behind mode choice: Evidence of motorcycle dependence in Taipei", *Transportation Research Part A: Policy and Practice*, 42(2), pp. 307–320.
- Delmelle, E.M. and Delmelle, E.C. (2012) "Exploring spatio-temporal commuting patterns in a university environment", *Transport Policy*, 21, pp. 1–9.
- Diana, M. (2008) "Making the "primary utility of travel" concept operational: A measurement model for the assessment of the intrinsic utility of reported trips", *Transportation Research Part A: Policy and Practice*, 42(3), pp. 455–474.
- Dias, C. et al. (2022) "Exploring home-to-school trip mode choices in Kandy, Sri Lanka", Journal of Transport Geography, 99(March 2021), p. 103279.
- Fauzi, I. and Basuki, I. (2016) "Pemilihan Moda Transportasi ke Kampus oleh Mahasiswa Universitas Gadjah Mada", in Konferensi Nasional Teknik Sipil 10.
- Frank, L. *et al.* (2008) "Urban form, travel time, and cost relationships with tour complexity and mode choice", *Transportation*, 35(1), pp. 37–54.
- Guillen, M.D., Ishida, H. and Okamoto, N. (2013) "Is the use of informal public transport modes in developing countries habitual? An empirical study in Davao City, Philippines", *Transport Policy*, 26, pp. 31–42.
- Irjayanti, A.D., Sari, D.W. and Rosida, I. (2021) "Perilaku Pemilihan Moda Transportasi Pekerja Komuter: Studi Kasus Jabodetabek", *Jurnal Ekonomi dan Pembangunan Indonesia*, 21(2), pp. 125–147.
- Jakarta Open Data (2014) Titik Rawan Kemacetan Tahun 2014.
- Jakarta Open Data (2017) Data Titik Kemacetan di Jakarta Barat Tahun 2017.
- Joewono, T.B. et al. (2013) "Exploring University Students' Activities and Travels based on Travel Diary Report", in: Proceedings of the Eastern Asia Society for Transportation Studiesastern Asia Society for Transportation Studies, 9(2008).
- Khattak, A. *et al.* (2011) "Travel by university students in Virginia: Is this travel different from travel by the general population?", *Transportation Research Record*, (2255), pp. 137–145.
- Krishnapriya, M.G. and Soosan George, T. (2020) "Mode choice behaviour of students, integrating residential location characteristics: A study from Kochi City, India", *European Transport - Trasporti Europei*, (79), pp. 1–17.
- Limanond, T., Butsingkorn, T. and Chermkhunthod, C. (2011) "Travel behavior of university students who live on campus: A case study of a rural university in Asia", *Transport Policy*, 18(1), pp. 163–171.
- Maulana, R. and Yudhistira, M.H. (2020) "Socio-Economic Factors Affecting The Choice Of Transportation Mode In Jakarta Metropolitan Area", *Jurnal Pembangunan Wilayah dan Kota*, 16(4), pp. 1–8.
- Ministry of Transportation of Republic Indonesia (2019) Land transportation in number (2018).
- Moniruzzaman, M. and Farber, S. (2018) "What drives sustainable student travel? Mode choice determinants in the Greater Toronto Area", *International Journal of Sustainable Transportation*, 12(5), pp. 367–379.
- Ng, W.-S. and Acker, A. (2018) "Understanding urban travel behaviour by gender for efficient and equitable transport policies", *International Transport Forum*, (2018–

01), pp. 1–19.

- Nguyen-Phuoc, D.Q. *et al.* (2018) "Mode choice among university students to school in Danang, Vietnam", *Travel Behaviour and Society*, 13(June), pp. 1–10.
- Olawole, M.O. and Olapoju, O.M. (2016) "Mode choice of undergraduates: A case study of lecture trips in Nigeria", *The Indonesian Journal of Geography*, 48(1), p. 145.
- Primasari, D.W., Ernawati, J. and W, A.D. (2013) "Pemilihan Moda Transportasi Ke Kampus Oleh Mahasiswa Universitas Brawijaya", *Indonesian Green Technology Journal*, 2(2), pp. 84–93.
- Ripplinger, D. and Brandt-sargent, B. (2009) "The Changing Attitudes and Behaviors of University Students Toward Public Transportation: Final Report", *Time*, (December), p. 19.
- Rodríguez, D.A. and Joo, J. (2004) "The relationship between non-motorized mode choice and the local physical environment", *Transportation Research Part D: Transport and Environment*, 9(2), pp. 151–173.
- Soehodho, S. (2017) "Public transportation development and traffic accident prevention in Indonesia", *IATSS Research*, 40(2), pp. 76–80.
- Tolley, R. (1996) "Green campuses: cutting the environmental cost of commuting", *Journal of Transport Geography*, 4(3), pp. 213–217.

Tomtom (2019) Tomtom Traffic Index 2019.

- Zhang, R., Yao, E. and Liu, Z. (2017) "School travel mode choice in Beijing, China", *Journal of Transport Geography*, 62(August 2016), pp. 98–110.
- Zhou, J. (2012) "Sustainable commute in a car-dominant city: Factors affecting alternative mode choices among university students", *Transportation Research Part A: Policy and Practice*, 46(7), pp. 1013–1029..
- Zudhy, M. *et al.* (2021) "Measuring the perceived need for motorcycle-based ridehailing services on trip characteristics among university students in Yogyakarta , Indonesia", *Travel Behaviour and Society*, 24(April 2020), pp. 303–312.

man	nuscript				
ORIGINA	LITY REPORT				
SIMILA	5% RITY INDEX	<b>11%</b> INTERNET SOURCES	<b>13%</b> PUBLICATIONS	6% STUDENT PAPER	25
PRIMAR	Y SOURCES				
1	Submitte of Techr Student Paper	ed to Visvesvara nology	aya National Ir	nstitute	4%
2	www.ist	iee.unict.it			1%
3	coek.inf	<b>O</b> ce			1%
4	reposito	o <mark>ri.usu.ac.id</mark>			1%
5	WWW.res	searchgate.net			1%
6	Kate E. N Carrasco commut travel", J Publication	Whalen, Antonic o. "Mode choice ting to school ar ournal of Trans	Páez, Juan A. of university nd the role of port Geograpl	students active hy, 2013	1%
7	Asad Kh Agnello. Virginia''	attak, Xin Wang "Travel by Univ ', Transportatior	, Sanghoon So ersity Student n Research Re	on, Paul < s in cord:	1 %

## Journal of the Transportation Research Board, 2018 Publication

8

Huanmei Qin, Hongzhi Guan, Zhihu Zhang, Liu Tong, Liyuan Gong, Yunqiang Xue. "Analysis on Bus Choice Behavior of Car Owners based on Intent – Ji'nan as an Example", Procedia -Social and Behavioral Sciences, 2013 Publication

<1%

9

Eleonora Sottile, Giovanni Tuveri, Francesco Piras, Italo Meloni. "Modelling commuting tours versus non-commuting tours for university students. A panel data analysis from different contexts", Transport Policy, 2022

Publication

10	repository.president.ac.id	<1 %
11	pub.epsilon.slu.se	<1 %
12	link.springer.com	<1%
13	www.emeraldinsight.com	<1%
14	www.hindawi.com Internet Source	<1 %

15	d.researchbib.com Internet Source	<1%
16	Mohsen Mohammadzadeh. "Exploring tertiary students' travel mode choices in Auckland: Insights and policy implications", Journal of Transport Geography, 2020 Publication	<1%
17	e-repository.unsyiah.ac.id	<1%
18	eprints.lse.ac.uk	<1%
19	www.aessweb.com Internet Source	<1%
20	Catarina Cadima, Cecília Silva, Paulo Pinho. "Changing student mobility behaviour under financial crisis: Lessons from a case study in the Oporto University", Journal of Transport Geography, 2020 Publication	<1%
21	Jeanly Syahputri, Tri Basuki Joewono, Muhamad Rizki, Dimas B.E. Dharmowijoyo. "Chapter 92 Online Shopping and Travel Behaviour Based on Information and Communication Technology Activity", Springer Science and Business Media LLC, 2021 Publication	<1%

22	Khaled Hamad, Phyo Thet Thet Htun, Lubna Obaid. "Characterization of travel behavior at a university campus: A case study of Sharjah University City, UAE", Transportation Research Interdisciplinary Perspectives, 2021 Publication	<1%
23	Mazen Danaf, Maya Abou-Zeid, Isam Kaysi. "Modeling travel choices of students at a private, urban university: Insights and policy implications", Case Studies on Transport Policy, 2014 Publication	<1%
24	Md Moniruzzaman, Steven Farber. "What drives sustainable student travel? Mode choice determinants in the Greater Toronto Area", International Journal of Sustainable Transportation, 2017 Publication	<1%
25	ascelibrary.org	<1%
26	ia802308.us.archive.org	<1%
27	www.tandfonline.com	<1%
28	Aida Ulfa FAZA, I Gusti Ayu ANDANI. "The	<1%

Behaviour in the Periphery Area and City

Centre of Semarang", Journal of the Eastern Asia Society for Transportation Studies, 2022 Publication

- Charitha Dias, Muhammad Abdullah, Ruggiero <1% Lovreglio, Sumana Sachchithanantham, Markkandu Rekatheeban, I.M.S. Sathyaprasad. "Exploring home-to-school trip mode choices in Kandy, Sri Lanka", Journal of Transport Geography, 2022 Publication
- 30 Khaled Hamad, Lubna Obaid. "Tour-based travel demand forecasting model for a university campus", Transport Policy, 2022 Publication
- 31 Mirbahador Yazdani, Mahsa Jafari, Shiva Yazdani, Elahe Raouf, Mahsa Shokrzadeh. "Students' trip mode choice in favourable and unfavourable weather conditions", Proceedings of the Institution of Civil Engineers - Municipal Engineer, 2019 Publication
- Paulo Ribeiro, Fernando Fonseca, Tânia Meireles. "Sustainable mobility patterns to university campuses: Evaluation and constraints", Case Studies on Transport Policy, 2020 Publication

<1%

<1 %

34	Weiyan Zong, Junyi Zhang, Biying Yu, Enjian Yao, Chunfu Shao. "Energy consumption in the transport and domestic sectors: a household-level comparison between capital cities of Japan, China, and Indonesia", Elsevier BV, 2020 Publication	<1 %
35	acuresearchbank.acu.edu.au	<1%
36	sportdocbox.com Internet Source	<1%
37	tigerprints.clemson.edu Internet Source	<1%
38	transweb.sjsu.edu Internet Source	<1%
39	Mahdi Aghaabbasi, Zohreh Asadi Shekari, Muhammad Zaly Shah, Oloruntobi Olakunle, Danial Jahed Armaghani, Mehdi Moeinaddini	<1%

Danial Jahed Armaghani, Mehdi Moeinaddini. "Predicting the use frequency of ride-sourcing by off-campus university students through random forest and Bayesian network techniques", Transportation Research Part A: Policy and Practice, 2020 Publication

# 40 Stephen Agyeman, Lin Cheng, Philip Kofi Alimo. "Determinants and dynamics of active school travel in Ghanaian children", Journal of Transport & Health, 2022 Publication

<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		