

# Sustainable Transportation on University Campus: A Case at UiTM Selangor, Puncak Alam Campus, Malaysia and Universitas Negeri Semarang, Indonesia

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# Sustainable Transportation on University Campus: A Case at UiTM Selangor, Puncak Alam Campus, Malaysia and Universitas Negeri Semarang, Indonesia

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**Abstract:** The increased awareness of the impact of carbon dioxide (CO<sub>2</sub>) emissions and consumption of fossil fuels on the environment has led to world-wide research focused on sustainable transportation solutions. University campuses are one of the affected environments involved in this issue as a high dependency on private vehicles causes traffic congestion in the campus area particularly during peak hours leading to concerns about parking especially for the established universities. Therefore, alternative transport solutions should be considered in minimizing the environmental consequences specifically within the campus area. This study aims to examine the extent of sustainable transportation practices implemented by a university campus in a developing country, Malaysia and Indonesia. A survey methodology was applied using self-administered questionnaires as the main technique of data collection. Both, UiTM Puncak Alam, Selangor, Malaysia and Universitas Negeri Semarang, Indonesia are selected as the sample study and the target observations are focused on the transportation pathway which includes transportation modes, passengers, terminal and parking space. The study is expected to enrich the existing sustainable model of Stakeholder Theory to deliver a more robust competency model to provide solutions creating sustainable transportation in university campuses. Subsequently, the outcome would support Sustainable Development Goals (SDGs 2030), Mid-term Review of the Eleventh Malaysia Plan [2016 – 2020], Indonesia's long-term development plan to phase IV period 2020-2025 through better adoption of low-carbon supply chain practices in order to reduce GHG emission. This is in line with Malaysia and Indonesia's commitment in being a key part of the global transition to a low-carbon, and eventually carbon-neutral society by 2050

**Keywords:** Environmental, Indonesia, Malaysia, Sustainable, Transportation, University

## 1. Introduction

Transportation plays a key role in promoting the livability of communities due to its interaction with all three areas of sustainable development which is economy, environment and society. Under this, stakeholder involvement is essential in order to incorporate diverse perspectives and preferences (Thirunavukkarasu *et al.*, 2014; Sundram *et al.*, 2016a). The high growth rates of transportation activity had generated negative effects on the environment and on populations who are experiencing numerous

traffic problems such as severe traffic congestion and road accidents coupled with air and noise pollution (Sundram *et al.*, 2017a). The transportation sector is the second largest contributor to carbon dioxide (CO<sub>2</sub>) emissions due to fossil fuel combustion. This sector makes up 28 percent of the total greenhouse gas (GHG) emissions and 25 percent of GHG emissions in the European Union. Every other sector contributes in reducing emissions, except for the transportation sector (Velazquez *et al.*, 2015). Thus, special attention must be paid to the need for decoupling transportation and CO<sub>2</sub>. It is obvious that under this context, transportation contributes little to sustainable development; therefore, urgent interventions are required to make the transportation sector more sustainable (Sundram *et al.*, 2017b). One of the key challenges for any sustainable system is to balance the environmental, economic, and social dimensions within decision-making processes (Akmal *et al.*, 2016; Sundram *et al.*, 2018). Although there is plenty of good information about sustainability and transportation modes in the literature, most of the articles focus on specific factors of the whole transportation system. Therefore, the originality or value of this paper is found in providing better understanding of the campus community perception towards sustainable transportation practices in campus environment. This is in line with UiTM Selangor and Universitas Negeri Semarang's (UNNES) aim to achieve sustainable development in all aspects.

Malaysia and Indonesia are both prime examples of developing Asian nations, showing substantial and consistent economic growth. Furthermore, both countries are known to be taking great efforts and concrete initiatives in order to achieve sustainable growth through preserving and improving the environment. On this basis, it is worthwhile to make a comparison between Malaysia and Indonesia. Malaysia and Indonesia both believe that initiatives and awareness regarding environmental sustainability should ideally be rooted within tertiary education, or the University environment. This is because these students are viewed as a strong influence on wider society, especially through the knowledge and platforms they are able to access through their education and their post-graduate working lives. As such, studying one university from each country will offer more insight into the potential for future economic sustainability.

## 2. Literature review

The environmental impacts of transportation are an important issue for the future with air pollution and global warming as the major problems. In many of the advanced economies, emission controls are enforced through the improvement of transport modal split between private transports versus public transport (Akar *et al.*, 2013; Cattaneo *et al.*, 2018). This particular shift of modal split or in other word, more dependency on public transport or non-motorized vehicles have reduced the potential air pollution impacts of road transportation in megacities. However, the benefits associated with such policies in these megacities are likely to be overwhelmed in the next two decades by further growth in vehicular traffic, due to continued reliance on private transport (Hoque *et al.*, 2017; de Sousa *et al.*, 2016). By contrast, in many of the developing economies, even elementary anti-pollution policies are lacking and the situation gives little hope for improvement, particularly with more rapid population growth than in the advanced economies. Furthermore, particulate emissions, particularly related to the use of diesel fuels, are a growing problem. Also, suburban sprawl has continued due to the affordability of private transport. Rapid awareness and realization of sustainable transport practices are vital to ensure environmental sustainability, particularly in the developing economies (Rajagopal *et al.*, 2015; Mkumbo *et al.*, 2019). Thus, transport planning and environmental impact have become decoupled. It is vital that a coordinated approach be taken for future development of developing countries like Malaysia and Indonesia. In addition, it is believed that the awareness and behaviour towards sustainable practices should begin from a university environment where the breeding of intellectual role models of our society takes place.

Increasingly, tertiary education institutions are taking steps to address their environmental impact and particularly their contribution to climate change, including the implementation of formal or informal environmental management systems (Sultana *et al.*, 2018). Malaysian tertiary institutions have begun to take a leadership role in sustainability through organizing programs towards sustainability such as with "Go Green Program", "Say No to Plastics Day" and "Save Rain Water Day". When implementing sustainable policy decisions, universities and their stakeholders have paid a great deal of attention to sustainability, yet they too often disregard issues of transportation and land use (Kelarestaghi *et al.*, 2019). Furthermore, although some campuses have been designed as pedestrian campuses but are caught by a

culture that encourages driving at every opportunity. This puts more pressure on campus officials to develop parking lots, increase the size and number of roadways, and neglect the type of infrastructure that would encourage non-motorized transportation (Khorheh *et al.*, 2015; Namgung and Jun 2019). This influence inevitably increases the interest in the private car usage among students and staff in the university. As such, university involvement in sustainable transportation is regarded essential as they are an important institution that is shaping the culture of the future generation and community surrounding. However, the literature on sustainable transportation in university and particularly in a developing country is still scant. Hence, it is timely to conduct a study on sustainable transportation in a university campus in Malaysia and Indonesia

### 3. Methodology

UiTM, Puncak Alam, Selangor and UNNES conducted this study for the first time collaboratively in 2019, as it was initiated by Institute of Research Management and Innovation (IRMI), UiTM Shah Alam. The current study specifically included the transportation sustainability practices in two (2) different campuses, UiTM, Puncak Alam, Selangor and UNNES. A questionnaire survey methodology was employed to assess both universities campus community's perceptions of transportation sustainability practices.

#### *Study Setting*

To identify the level of transport sustainability from a perception point of view, this study utilised cross-country [Malaysia and Indonesia] survey data collected from stakeholders [students and staffs] of two universities. The selection of universities was predetermined by the grant provider for various reasons. Indeed, cross-country specific studies are required since the characteristics of transport sustainability practices might differ among these two developing countries and by emphasizing the perception of various stakeholders, in this study, a descriptive analysis is required for better understanding and avoiding the heterogeneity problems (Sundram *et al.*, 2016b).

#### *Sampling design and data collection*

This study primarily uses individuals as the unit of analysis and the target respondents were the university campus stakeholders, primarily students and staff (academic and non-academic). The main reason to focus only on students and staff is to capture the wider scope of the population, which utilizes both personal vehicles and public transport while on campus. A total of 312 respondents [161 UiTM and 151 UNNES] respondents were randomly selected from the Student & Staff Information [SSI] database of both respective universities. A questionnaire-based survey was carried out in a period of three months.

#### *Measurements*

Measurement of transport sustainability perception and practices within university campus is necessary to address the objectives of this study. A measurement instrument or questionnaire items was developed based on the literature and consisted of four main sections, including the respondents' profile, transport sustainability barrier, perception on utilization, importance of transport sustainability and suggestion for improvement. This study uses a five-point scale as a unit of measurement ranging from 'Strongly agree / important' to 'strongly disagree / not important' in relation to their perception / suggestion. The questionnaire was later pre-tested by two professionals in practice. Based on expert advice of the professionals, the full set questionnaire was tested for robustness.

#### 4. Data analysis and findings

##### Respondents Profile

**Table 1:** Descriptive Statistics of studied Socio-Demographic Characteristics variables

DEMOGRAPHY	GROUP	UiTM		UNNES	
		No.	%	No.	%
Gender	Male	29	18	48	32
	Female	132	82	103	68
Age Group (years old)	18 -30	137	85.1	112	74
	31 – 45	20	12.4	36	24
	46 – 60	4	2.5	3	2
	>61	-	-	-	-
Marital Status	Single	132	82	113	75
	Married	29	18	38	25
Education Level	Foundation	23	20.5	21	14
	Diploma	119	73.9	99	66
	Bachelor's	8	5	28	18
	Degree Master	1	0.6	3	2
	PHD				
Position	Student	119	73.9	105	70
	Academic staff	21	13	23	15
	Admin Staff	21	13	23	15
Place of Residence	College	105	65.2	87	57
	Non – Residence	56	34.8	64	43
How do you travel to faculty?	Walking	29	18	34	23
	Cycling				
	Bus	55	34.2	2	1
	Motorbike				
	Car	20	12.4	2	1
	Carpooling	46	28.6	100	66
Others		10	6.2	11	7
		1	0.6	2	1
				0	0

Table 1 depicts the statistical result of socio-demographic characteristic variables of both UiTM and UNNES campus. It indicates that the female respondents are more predominant in this survey with the percentage of 75% equivalent to 235 respondents. This showed that female respondents are more interested to participate in this survey and they are the larger occupants of campus residence. This study encompasses respondents ranging from 18 years old until 61 years above and is predominant by those within the age group of 18 – 30 years old. This shows that our survey covers mostly young adult and middle – aged adults. Furthermore, it is also due to the fact that our respondents are mostly students with an average of 70% in both campuses. Since most of the respondents are undergraduates and postgraduates, the study concludes that all respondents should have a good understanding of the aim of the survey. In terms of place of residence, our respondents are majority college residents with 65.2% [UiTM] and 57% [UNNES] respectively. This shows that the respondents need to use transportation to travel to faculty daily either from the campus hostel or private residence which is located outside the campus within the radius of 5 to 10 km distance. Nevertheless, there is a clear demarcation in terms of modes of travel between UiTM and UNNES. For example, the modal split between public vehicle and private vehicle showed that UiTM is more inclined to utilize the public transport compared to UNNES.

**Motive and Choice of Transportation**

**Table 2a:** Choice of transport for different journey for UiTM respondents

Choice of transport	Travel to university		Leisure Time		Event		Faculty Program		Work	
	No	%	No	%	No	%	No	%	No	%
Walk	21	13.04	43	26.71	28	17.39	30	18.63	12	7.45
Train	3	1.88	9	5.59	3	1.88	2	1.24	17	10.56
Bus	65	40.37	23	14.29	48	29.81	63	39.13	36	22.36
Taxi	1	0.62	3	1.86	4	2.48	2	1.24	3	1.86
Cycle	-	-	1	0.62	-	-	-	-	1	0.62
Car	58	36.02	69	42.86	70	43.48	48	29.81	74	45.96
Motorcycle	13	8.07	13	8.07	8	4.97	16	9.94	18	11.18

**Table 2b:** Choice of transport for different journey for UNNES respondents

Choice of transport	Travel to university		Leisure Time		Event		Faculty Program		Work	
	No	%	No	%	No	%	No	%	No	%
Walk	49	32	65	43	36	24	55	36	38	25
Train	5	3	96	63	4	3	2	1	3	2
Bus	26	17	1812	1141	39	26	29	19	39	26
Taxi	2	1	21	14	3	2	2	1	2	1
Cycle	3	2	21	14	2	1	6	4	2	1
Car	8	5	107	71	17	11	9	6	8	5
Motorcycle	58	38	4530	2986	50	33	48	32	59	39

Table 2a and 2b shows the respondents' choice of transport for various journeys such as travel to university, leisure time, event, faculty program and work for both campuses. The result in table 2a specifically depicts that bus services have been the preferred choice of transportation for the purpose of travelling to the university and faculty program. This shows that the university actually provided bus transport services and the faculty encouraged students to patronize the public transport. Also, the highest utilization of bus services during faculty programs indicates its travel convenience. Nevertheless, travel by car is predominantly the most preferred method across the board. It might be the most comfortable mode of transport for students and staff of UiTM Selangor. During leisure time, there is strong preference to travel by car with 42.86%, followed by walk (26.71%), bus (14.29%), motorcycle (8.07%), train (5.59%), taxi (1.86%) and cycle (0.62%). Leisure time includes both, indoor and outdoor activities. Unfortunately, cycling is the least preferred method of transport among UiTM Selangor community which might be due to several factors such as distance to faculty/university, longer travel time, inconvenience due to weather uncertainty and difficulty in transporting passengers. This does not mean that they are totally not concerned about practicing sustainable transportation because there is still a high percentage of preference given to walking compared to motorcycles in order to travel to university. Cars are the most popular choice across the board for most of the purpose which is commonly due to convenience and affordability. The result in table 2b specifically described that motorcycles, walking and bus are the three of most preferred order of transport options of staff and students of UNNES. Motorcycles are used for the purpose of traveling to university, events and work. The use of motorcycles is preferred in the internal campus environment due to the convenient parking lot. It does not mean that UNNES does not support sustainable transportation, but to support the creation of orderly, neat and environmentally friendly

conditions, UNNES provides parking spots that can accommodate a number of motorcycles. Access parking points through public roads tends to avoid the main pathway of the campus. This effort is to minimize the movement of motorcycles in the main pathway of the campus prioritized for environmentally friendly transportation or walking. There are 7 (seven) parking points provided to meet the needs of the user, namely: North Side West Gate, PKMU, GSG, Masjid Uilil Albab, Faculty of Educational Science, Faculty of Social Sciences and south side of Faculty of Sports Sciences. The reason that motorcycles are used as transportation devices in the external environment of UNNES is due to the easy mobility. Walking is the second option preferred by the staff and students of UNNES during leisure time and faculty programs. This is due to the availability of facilities that support walking habit, it is pedestrian that is divided into two precisely in the Eastern campus area and West Campus area that makes up the corridor line. Another thing that supports walking is that there are many vegetation species that serve as the shade, direction, and aesthetic of the campus. The operational standards of UNNES internal transport procedures have also been developed by the Conservation Development Agency since 2013. The Bus is the third most picked transportation that is preferred by the staff and students of UNNES to travelling to university (17%), leisure time (12%), event (26%), faculty Program (19%), work (26%). The UNNES Campus Bus is a vehicle serving the people of UNNES in a campus activity that operates in four buses. But the campus bus is no longer operated because there is a Bus Rapid Transit (BRT) Trans Semarang by UNNES- UNDIP line that entered the campus which commenced operation on March 31st, 2017. Cycling is the least preferred method of transportation for the staff and students UNNES, because the distance between the university and the shelter are too far away and the natural condition of the campus in the Highland area is not possible to use cycling method although the bicycle shelter is already available on campus.

### Barrier to using Public Transportation

**Table 3:** Descriptive Statistics of Preventing Factors for using Public Transportation

Barrier /Prevention	UiTM		UNNES	
	Mean	Standard Deviation	Mean	Standard Deviation
Lack of available information	2.33	1.02	2.18	0.98
Distance from bus station/train station	1.83	1.04	1.90	1.02
Cost	2.06	1.23	1.92	1.08
Weather	1.78	0.95	1.85	0.99
Safety	1.62	1.01	1.51	0.88
Frequency of service	1.63	0.94	1.80	0.95

Table 3 shows the barriers for using public transport services. Most of the respondents from UiTM and UNNES do agree that safety, frequency of service, weather, cost, distance from transport terminal/ station, and lack of information are the main barriers for utilizing public transportation services. Safety element is perceived as the main barrier for public transport usage in both UiTM and UNNES with the mean value of 1.61 and 1.51 respectively. The weather in [Malaysia](#) and Indonesia is hot and humid year round, interspersed with unpredictable tropical rain showers is also perceived as a very important barrier not only for university students and staff but the general public at large. In conclusion, distance from bus station/train station, weather, safety and frequency of service are the most severe barriers while lack of information and cost are considered second in line. The result clearly indicates the reason why the campus community are not fully embracing and supporting the usage of public transport services and this could be the reason why private vehicles are mostly preferred at any course.

### Factors influencing the choice of Transportation

**Table 4:** Descriptive Statistics of Estimation Important Choice of Transportation

Factor	UiTM		UNNES	
	Mean	Standard Deviation	Mean	Standard Deviation
Relaxing	1.85	0.96	1.45	0.85
Health	1.81	0.92	1.49	0.80
Environmental benefits	1.80	0.89	1.64	0.87
Cost	1.76	0.99	1.76	1.00
Weather	1.67	0.80	1.78	0.93
Safety	1.49	0.78	1.45	0.78
Reliability	1.70	0.81	1.72	0.92
Time Taken	1.50	0.80	1.58	0.87
Convenience	1.58	0.81	1.51	0.83
Route	1.69	0.82	1.66	0.88

Table 4 shows the important choice of transportation among campus communities in both universities. Several important factors are selected through literature survey above and play a role in people making the decision to choose any transportation. Respondents need to rate on each choice or reason for selecting a specific method of transportation between strongly agree (1) to strongly disagree (5). The results indicate that the choice of transportation is bound by several factors such as relaxing, health, environmental benefits, cost factor, weather, safety elements, reliability, journey time taken, convenience and route. As overall, all the factors above are very important factors to be taken into consideration before the choice of transportation is made. Factors such as relaxing, health environmental benefits, cost, weather, safety, reliability, time taken, convenience and route are rated very important with the mean less than 2. The standard deviation for every factor is approximately close to mean which interprets that each respondent is consistently agreeing that all factors above are very important factors in determining the choice of transportation in both the universities.

### Suggestion to promote Sustainable Transportation

**Table 5:** Opinion about improving sustainable transportation on University Campus

SUGGESTION	UiTM		UNNES	
	Mean	Standard Deviation	Mean	Standard Deviation
<b>CAMPUS BUS-RELATED SUGGESTION</b>				
1. Provide bigger space of bus stop	3.86	1.05	4.11	0.93
2. Increase the number of bus on peak	4.31	0.94	4.14	0.89
3. Provide the bus lane in campus	4.17	0.98	4.11	0.96
4. Reduce waiting line	4.14	1.05	4.08	0.84
5. provide the real-time panel on every bus stop	4.24	0.97	4.19	0.89



WALK-RELATED SUGGESTION				
1. Provide more strategic walkway	3.95	0.98	4.40	0.88
2. Expand the walkway route	3.73	1.02	4.32	0.91
3. Provide more covered walkways	4.08	1.02	4.35	0.91
BICYCLE-RELATED SUGGESTION				
1. Provide the electric bicycles for users	3.70	1.06	4.15	1.03
2. Provide the rest area for bicycle lane	3.81	0.97	4.24	0.93
3. Provide the bicycle loan service	3.57	1.04	4.27	0.99
UNIVERSITY PROGRAM-RELATED SUGGESTION				
1. Develop bonus reward card for campus bus user	3.94	0.97	4.00	1.06
2. Continuous promotion campaign	3.99	0.96	4.10	0.91
3. Promote free car day	3.95	1.04	3.84	1.24

Table 5 shows the opinion about promoting sustainable transportation on university campuses at both UiTM Selangor and UNNES. The suggestion includes several programs such as campus bus-related suggestion, walk-related suggestion, bicycle-related suggestion and university program-related suggestion. Respondents need to rate whether on each suggestion between the measurement scales of strongly disagree (1) to strongly agree (5).

For campus bus-related suggestions, focus was mainly given to the improvement of travel time and reliability of the service. As such, the majority wanted to increase the number of buses on peak, provide the bus lane in campus, reduce waiting lines and provide the real-time panel on every bus stop. UNNES respondents were more concerned of the bigger space of bus stops compared to UiTM Selangor which would have been due to the student population size which is relatively bigger. As such, UNNES respondents do have strong support towards Walk-related effort compared to UiTM Selangor especially in providing more strategic walkway, expand the walkway route it only neutral and provide more covered walkways. This suggestion helps pedestrians to walk and reduces the usage of motorised transportation to travel. Similarly, bicycle-related suggestions also have strong support from UNNES compared to UiTM Puncak Alam campus especially in providing the electric bicycles for users, provide the rest area for bicycle lanes and provide the bicycle loan service. In addition, the University program-related suggestion is also perceived as an important factor especially through the development bonus reward card for campus bus users, continuous promotion campaign and promotion of free car day. As such, university program-related suggestions also give a positive impact on promoting sustainable transportation practices in both campuses. Overall, all the proposed suggestions received overwhelming feedback from the respondents.

## 5. Discussion

The importance of transportation sustainability has been gradually gaining acceptance among different organizations. Higher education institutions are adopting sustainable transportation systems in order to reduce their parking construction and operations costs, improve liveability on their campuses, and reduce their negative impact on the environment (Sultana et al., 2018). When referring to a higher education campus, sustainable transportation almost always translates into reducing single-occupancy trips to campus and encouraging the use of more efficient transportation modes. The most important challenge with regard to sustainable campus transportation systems is to ensure that its concepts are implemented in a comprehensive manner, addressing a sustainable campus transportation system and providing improved alternative transportation infrastructure. Previous studies also highlighted a similar challenge with regards to sustainable transportation (Kelarestaghi et al., 2019; Khorheh et al., 2015;

Namung and Jun, 2019). This study addresses these aspects of transportation sustainability focusing on two university campuses, UiTM Selangor and UNNES. This study was able to accomplish its goal through the completion of the literature review and quantitative survey.

Based on the survey most of the respondents have good understanding on the sustainable transportation effort for their campuses. Both universities have given valid suggestions to embrace sustainable transportation is general and these suggestions could be used to set objectives for the enhancement of transport sustainability programs. This was evidently proven as some respondents have led to a commitment to utilize high occupant vehicles or mass transit, biking and walking in their day to day travelling. Nevertheless, this could not have started without a meaningful top-level institutional commitment to improve its sustainability performance record. As such the role of various stakeholders right from students to policy makers should play a critical role in maximizing the sustainable transportation effort (Akar et al., 2013; Cattaneo et al., 2018; Hoque et al., 2017; de Sousa et al., 2016). This is achieved through informing people about their transportation choices, emphasizing the benefits of alternative transportation, and making the use of alternative transportation part of the mainstream culture of the campus.

## 6. Conclusion

### *Theoretical and Practical implication*

Theoretically, the research helps to explain the characteristics and the comparative significance that is linked with both the campuses, UiTM and UNNES in their perception towards sustainable transportation practices. The study shows the overall acceptance and behavioral aspect of sustainable transportation in campus environments which specifically includes current transportation preference, barriers to sustainable transportation and reason cum suggestion for better sustainable practices. This study gives insights to Malaysian and Indonesian universities on the important factors to consider in the next study of sustainable transportation.

This study also offers a number of practical implications. The universities could use this study to further understand and examine the issues and challenges of implementing a sustainable transportation system, not only in the campus but also off campus. It provides opportunities for university administrators and education policy makers to enhance their sustainable effort, which in return allows this education industry to implement transportation sustainability across and within the education supply chain. The education administrators need to make the best decision when it comes to identifying the potential in transportation sustainability. As such this study provides sufficient preliminary information to all stakeholders for better decision making.

### *Policy Implication*

Understanding the above phenomena, this study also benefits all practitioners, academicians, researchers, policy makers and government administrators in Malaysia and globally. The government should place guidelines on the education blueprint to ensure the current policies on green and sustainable transportation in the education supply chain is carried out with due diligence. The current education system in Malaysia and Indonesia provides adequate guidance in the awareness and implementation of sustainable transportation projects. Unfortunately, the outcome and the results are still not commendable compare to the universities in the European Union.

Therefore, all stakeholders and public at large should start to embrace more sustainable practices and integrate effort to promote transportation suitability projects and effort across the education supply chain. This is in line with the new National Transport Policy 2019-2030 in Malaysia which ensure that effective and efficient integration of transportation system to support not only business competitiveness but also environmental sustainability. Subsequently, the outcome would support Sustainable Development Goals

(SDGs 2030), Mid-term Review of the Eleventh Malaysia Plan [2016 – 2020] and Indonesia's long-term development plan to phase IV period 2020-2025. through better adoption of low-carbon supply chain practices in order to reduce GHG emission. This is in line with Malaysia's commitment in being a key part of the global transition to a low-carbon, and eventually carbon-neutral society by 2050

### **Limitation and Future Research**

A few limitations have been identified and recognized while conducting this research. The study is limited by scope. First, the study only focused on one university in each country (Malaysia and Indonesia), which may subject it to regional clustering bias. This limits the applicability of the findings to other types of industries. The respondents are only from two universities which need to incorporate more samples from other universities as well for better representation and generalization in the higher learning environment. The scope of study is only focusing on transport sustainability, which is quite different from other dimensions of sustainability such as environmental sustainability, water conservation, energy saving facilities etc. Therefore, the findings of this research may not be generalizable to other industries and the overall sustainable movement in the university environment in total.

There is limited literature on the roles of internal stakeholders' involvement and government strategy in promoting sustainable transportation in the education supply chain. The awareness and practices of transportation sustainability across the education supply chain is enormously essential rather than just concentrating each entity in the education system in silo. In other words, the successful implementation of sustainable transportation in the university environment or education industry is very much dependent on the overall education policy right from the primary, secondary and tertiary level. The awareness needs to be inculcated right from the beginning at each childhood education so that this behavioral change and adaptation towards sustainability will be continuously practiced as they go up the value chain in the education stream.

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