FUTURE CITIES AND ENVIRONMENT

Readiness of Implementing Vehicle End-of-Life Policy: A Case Study From Kuala Lumpur, Malaysia

CASE STUDIES

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ABSTRACT

In achieving SDG-11 Sustainable Smart City, many government strategies and initiatives need to be implemented, especially involving transportation. In Malaysia, transportation is a medium that connects job opportunities with people's welfare. Nonetheless, Malaysia still has no restrictions on vehicle ownership, especially in urban areas like Kuala Lumpur. This study was carried out to achieve the following objectives: to explore how individual commute to work in Kuala Lumpur by exploring modes of transportation used; to investigate the vehicle ownership and its impact on vehicle end-of-life. Data were collected from archive of Malaysian government report includes Malaysian Well-Being index and the Malaysian Transportation Statistics Report. Next, the research team visited residential areas, workshops and vehicle impound storage depots to collect data related to abandoned cars since they have an impact on the upward trend in car ownership and challenges in disposing those vehicles. The findings established that people commute extensively to work by car, causing traffic congestion in Kuala Lumpur. It was also found that there is no limitation on vehicle use, making public transportation the secondary choice to commute to work. Consequently, there is no policy related to car ownership and end-of-life vehicle in place which cause problems not only in increasing the use of vehicles but also on their disposal.

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INTRODUCTION

In moving towards SDG-11 Sustainable Smart City, among the things of concern are safe, affordable, accessible and sustainable transport systems for all, as well as improved road safety notably by expanding public transport with special attention to the needs of those in vulnerable situations, women, children, people with disabilities and elderly. However, in most countries, these challenges have not yet reached an adequate level, but are more directed towards the basic issue of the use of transport itself being the main issue.

The attraction of job opportunities in cities causes more than half of the global population to live in urban areas (Ceder, 2021). The World Health Organisation predicted that the population in urban areas will continue to expand by more than 1.5% per year until 2030. The likely consequences of this are more traffic congestion, pollution and noise (Ceder, 2021; Cleophas et al., 2019) which would render a modern urban economy inefficient to function productively (Ceder, 2021). This is because the public transportation provided is not sufficient to accommodate the needs of the population that is increasingly coming to the city to work. In addition to these shortcomings, public transportation is also seen as inefficient for employees to use as the available network is limited and further reflect their satisfaction with the value of time, fare and convenience.

Movement of people from home to work has become a daily activity. People will choose whether to use private ownership or public transportation to commute between places. Job opportunities mostly focus on the central city area. However, the housing area in the city area is not affordable since the rental cost or house price in the city area is much higher than in other areas. Therefore, many workers have to choose to live in suburban areas where house prices or rent are cheaper; therefore, the mode of transportation chosen for commuting to work is very crucial. An accommodation that is further from the city has a lower price compared to that which is close to the city. However, despite the reduction in accommodation expenses, travellers are forced to travel for a long period or far away. According to Rapino and Field's (2013) study, travellers with the highest distances travelled in the 90s in the United States reached 90 minutes or travelled as far as 50 miles one way. Studies by De Vos (2019) stated the effect of trip duration on travel satisfaction, indicating that longer trip durations often result in low satisfaction levels among passengers. In a recent study, an appropriate commute time range is between 5–25 minutes (Yang et al., 2022). This is because it is believed that the public transportation provided is more efficient and the road network is getting better which shortens the travel time.

LITERATURE REVIEW

Kuala Lumpur remains as an administrative and commercial centre since colonial. Therefore, many people from rural areas have migrated to Kuala Lumpur. They were the low-income group who found job opportunities in the urban area. These people were living in squatter settlements and when it was overcrowded in 1990, the Kuala Lumpur City Hall relocated them to the suburban area such as Gombak, Selayang, Petaling Jaya, Shah Alam, Klang and Bangi, which are also known as Klang Valley, by offering them low-cost public housing (Agus, 2017). Therefore, they remain staying in this area and travel to Kuala Lumpur for work. Since the population in this area grows denser, in 2003, the administrative centre was moved out from Kuala Lumpur to Putrajaya, which to some extent helped to reduce the population density (Moser, 2010; Rasoolimanesh et al., 2021), in addition to reduce traffic congestion. Previously, the congestion occurred due to workers in the government and private sectors, as well as businesses flocking to the city centre to work. However, it was observed that even though the government administrative centre had moved to Putrajaya involving 24 government agencies, traffic congestion is still high in the Kuala Lumpur area. This demonstrates that there is a large number of people who are employed by private businesses, traders and other individuals who are currently without a permanent job but are looking for work prospects in the central business district of the city commute daily from their homes to Kuala Lumpur.

Malaysia's economic development from 2009 to 2016 has accelerated and per capita income has increased during that period, improving purchasing power. More people became able to purchase their own private vehicles since during that time, Malaysia's automobile industry became flooded with many new models from national car companies such as Proton, Naza and Perodua which offer cars that are equivalent to imported cars but with much cheaper and affordable prices. By the end of 2019, the number of private cars has increased; this also includes cars that have been in use for more than 10 years. As the car ages, the car engine wears away and crashes in tanks are enlarged, resulting in more friction during rides and leading to more noise. This will increase the chance of a higher breakdown rate and operation costs. Ageing cars are categorised based on the year of production, mileage and the condition of the car. These ageing cars are liable to break down during driving and may implicate traffic accidents. Not only that, ageing cars consume much more fuel and energy adding to environmental pollution (Chen & Lei, 2017). Additionally, there are other negative impacts of this such as bad air quality and increased amount of pollutants in car exhaust as the car ages, increase in fuel consumption and breakdowns, causing accidents and traffic jams.

Recently, the government of Malaysia has introduced a National Transportation Policy 2019–2030 (NTP 2019–2030) in supporting sustainable transportation which is crucial to ensure the successful implementation of SDG 11, the sustainable cities and communities. The NTP (2019–2030) plays the main role in maintaining the three main elements of sustainable transportation; environmental, economic and social elements. Policy thrust number 4 has mentioned that the vehicle end-of-life procedure to ensure an efficient, clean and resilient transport system with minimal impact on the environment and natural resources while providing efficient mobility. However, there are no specific guidelines on how to manage the vehicle end-of-life. Since the government does not yet have a vehicle end-of-life procedure or even a vehicle elimination policy, many obsolete vehicles are flooding the streets. Therefore, according to Hidayati et al., (2021), the implementation of NTP (2019–2030) will impose a great challenge since the mechanism requires a holistic planning practice and integration.

There are many ways in implementing the vehicle end-of-life programme such as imposing a limitation on old vehicles by excluding old vehicles on the federal and highway, increasing annual road tax and incrementing fine upon ageing car breakdowns. However, the vehicle end-of-life programme will not benefit the well-being of the low-income group. Implementation of this programme will be a trade-off between welfare and emissions under low carbon emissions (Zhang et al., 2018). This group depends so much on transportation to go to work (Mohd Zahari et al., 2023). This group will be affected so much since they have no option but to use public transportation with the current status of limited transportation.

Since there are so many limitations of public transportation, people need to drive their vehicles to work which will increase the levels of motorisation, congestion, longer commuting times and emissions (Acheampong, 2020). This has also resulted in the creation of other difficulties such as an excessive number of vehicles on the road and problems associated with the management of old vehicles. Therefore, this study was carried out to achieve the following objectives: to explore how individual commutes to work in Kuala Lumpur by exploring modes of transportation used; to investigate the vehicle ownership and its impact on vehicle end-of-life.

MATERIAL AND METHOD

This research used qualitative methods. The research location is in Kuala Lumpur which is the most densely populated in Klang Valley and also the capital of Malaysia. There are major commercial, premier business precincts and over 400 financial institutions covering 2,000 Small and Medium Enterprises, as well as business firms. Klang Valley's growth mainly comes from an increase in job opportunities in Kuala Lumpur.

The process of data collection involves the analysis of documents, specifically reports such as the Malaysian Well-Being Index and the Malaysian Transportation Statistics Report (Ministry of Transport Malaysia, 2023). These reports are utilised to extract data pertaining to vehicle registration and ownership within the Kuala Lumpur area. Additionally, content analysis of policies concerning vehicle management in Malaysia is conducted. Furthermore, a field observation was conducted to examine the factors contributing to traffic congestion in Kuala Lumpur. This investigation was based on the statistics of Average Daily Traffic in Kuala Lumpur. Subsequently, a field visit and observational study were conducted in three residential localities, a car repair workshop and a tow vehicle storage depot to assess the condition of abandoned end-of-life automobiles within the vicinity.

All the data obtained from the documents were subjected to content analysis (Bowen, 2009; Zhang & Wildemuth, 2005), while the data obtained from the observations were systematically written in field notes (Sanjek, 1990). Data was organised according to dates and phenomena. Themes and key patterns emerged were then identified. (Fereday & Muir-Cochrane, 2006).

RESULTS AND DISCUSSION

VEHICLE OWNERSHIP

The massive road constructions in 1960s and road expansion in Kuala Lumpur city areas have reflected in current mobility behviour where most of the people are car oriented and owns personal cars. The national car project in 1980s has changed the affordability of the people where Malaysian afford to have their owns car. On top of that, inadequate public transport and lacking of integration of modes and operator with the expansion of enormous highway have encouraged the high usage of own vehicle (Hidayati et al., 2021).

To meet job requirements, travelling to work is a must as most workplaces are located in the city. Therefore, some individuals choose to either take public transport or drive to work. The analysis of the open data pertaining to the Malaysian Well-Being Index and the Malaysian Transportation Statistics Report reveals information regarding the upward trend in car ownership within the city of Kuala Lumpur. Figure 1 demonstrates the rise.

Despite its small area of 244 km^2, the city of Kuala Lumpur accommodates a substantial number of over 700,000 cars. This observation indicates the absence of any regulation aimed at limiting vehicle ownership, not only inside Kuala Lumpur but also across Malaysia as a whole. This phenomenon arises due to the very low

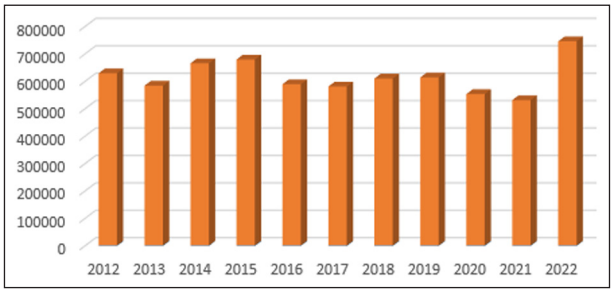

Figure 1 Upward trend of car ownership in Kuala Lumpur.

pricing of vehicles, particularly those manufactured in Malaysia. The promotion of vehicle ownership is additionally facilitated by the availability of extended higher purchase loans of up to a maximum of 9 years for new vehicles. Furthermore, there are various contributing factors that contribute to the rise in vehicle ownership, including the affordability of second-hand vehicles and the option of extended higher purchase periods of up to 7 years. The government provides a subsidy for petrol, resulting in a price of RM2 which is equivalent to USD0.44, per litre.

DAILY COMMUTE

The phenomenon of traffic congestion is observable on a daily basis in various areas, ranging from suburban to urban locations. This phenomenon occurs due to individuals commuting to their workplaces. The primary determinants contributing to traffic congestion are the population density in close proximity to urban employment centres, the number of businesses that were actively operating and the number of registered owned vehicles. This was caused by the people choosing to commute by car rather than public transport. Dunphy and Fisher (1996) have documented an observed increase in population densities in both urban and suburban areas since 1990. While this phenomenon has had significant implications for traffic congestion, it is important to note that it does not necessarily lead to a reduction in suburban travel or the underlying travel requirements associated with such areas.

Based on observations conducted in designated research sites, it has shown that there are certain limitations exist pertaining to the utilisation of public transportation for commuting purposes among individuals residing in suburban areas who seek to travel to urban centres for employment purposes. Individuals have no choice but to stay in suburban areas due to their proximity to residential districts that encompass urban centres, where housing costs and rental rates are comparatively elevated. Consequently, a greater number of individuals choose to reside in locations that are somewhat distant from urban centres. Since they live in this area, they have to commute every day to the city. The issue at hand pertains to the insufficiency of the available public transit services. The focus of public transportation is more on urban areas. Individuals who are residing in places reliant on public transportation often encounter extended travel durations, as they are required to navigate via multiple routes and types of transportation. The public transportation network in Kuala Lumpur, comprising mostly of buses, LRT (Light Rail Transit) and MRT (Mass Rapid Transit) systems, has limitations in terms of coverage and accessibility, particularly in suburban areas (Hoo et al., 2023). The restricted extent of public transportation services can pose inconveniences for individuals residing in areas with inadequate coverage. In addition, individuals also face the issue of "last-mile" connectivity poses a notable challenge for individuals utilising public transportation. Upon disembarking from a bus or train, they may find it necessary to depend on alternative means of transportation such as walking or using taxi, grab services in order to reach their final destinations which is their workplace. This phenomenon has the potential to increase the duration and cause inconvenience to commute to work.

Consequently, a greater number of individuals demonstrate a preference for commuting to work by using own vehicles. Despite the presence of congestion, various contributing factors, including insufficient public transportation, affordable fuel costs and ample parking availability which is near their workplace with reasonable parking charges can make driving more attractive, have led individuals to opt for commuting to work and subsequently resulted in a rise in vehicle ownership (Mohamad & Kiggundu, 2007).

NATIONAL TRANSPORTATION POLICY 2019–2030 AND READINESS TO DISPOSE OLD VEHICLES

There is a need for individual to drive to work even in the state of traffic congestion every day, showing that many people still choose to drive instead of taking public transport. The National Transportation Policy 2019–2030 (NTP 2019–2030) was developed to lay the policy thrusts and strategies that will enhance the economic competitiveness of Malaysia, provide strong social impact particularly with respect to inclusivity and accessibility, and reduce the negative impact that the transportation system has on the environment. It is also one of the government initiatives towards achieving SDG-11. All of these goals will be accomplished while simultaneously reducing the negative impact that the transportation system has on the environment.

The Ministry of Transportation (MoT) developed a range of strategies aimed at enhancing transport management efficacy as part of the National Transport Plan (NTP) 2019–2030. Furthermore, the MoT has emphasised the promotion of Public Transportation utilisation, particularly in urban areas (Ministry of Transport Malaysia, 2019) by delineating five strategies to accomplish these objectives.

a. Compliance to acts/regulations & shift towards international environmental standards.
b. Prioritise public network as a fundamental structure in urbanised areas.
c. Accelerate implementation of low carbon mobility.
d. Institute measures to control pollution, noise and waste from the transport sector.
e. Develop effective communication, education and public awareness (CEPA) to create behavioural change.

What is interesting is that the MoT also issued critical action items which is to build a mechanism for vehicles end-of-life where the procedure does not yet exist even though this policy was introduced in 2019. Based on the aforementioned facts pertaining to vehicle ownership and daily commuting, it is evident that the formulation of an effective vehicle end-of-life plan holds significant importance. This is primarily due to the absence of any impediments preventing individuals from owning their own vehicles or restrictions on driving within certain areas, as observed in the current context. The presence of multiple elements that contribute to the ownership of private vehicles indirectly leads to a rise in vehicle usage, particularly in cities like Kuala Lumpur. In addition to the absence of a vehicle-end-of-life procedure, it has been observed that Malaysia lacks a formalised disposal process for vehicles. Consequently, a significant number of vehicles exceeding 10 years of age continue to operate on the roads, alongside a notable presence of abandoned vehicles along roadways.

ABANDONED VEHICLE

In order to assess the implications of vehicle ownership and daily commuting patterns, it is important to consider the underlying factors contributing to this phenomenon. Specifically, the absence of incentives to utilise public transportation, the insufficiency of public transportation options in suburban residential areas and the absence of restrictions on vehicle ownership collectively act as catalysts, resulting in a cascading effect. The current situation is characterised by a growing escalation and exacerbation of issues related to the influx of vehicles. However, there has been a lack of implementation of effective vehicle disposal methods, leading to a noticeable rise in the number of abandoned cars which support the study by Kim et al., (2015), where people are less likely to dispose of their vehicles due to social economic effects. They will only rid of their car if there is an alternative mode of transportation (Oost, 2021).

The presence of abandoned vehicles is frequently observed in several locations, including residential areas (Figure 2), establishments specialising in dismantling automobiles for spare components (Figure 3), and towed vehicle (impounds) storage facilities (Figure 4). Visits were made to three residential areas, two car repair workshops and the towed vehicle (impounds) storage areas within the Klang Valley as in Table 1. It was observed that many abandoned vehicles were not well-managed. The abandoned vehicles have been at least 5 years old and some have reached 15 years. The vehicles have been abandoned for a very long time

LOCATION	SURROUNDING SITUATION	OBSERVATIONS
Residential Area 1	1. Low-cost flats. 2. Each resident has 1 parking lot. If they have more than 1 car, they need to park in the open space provided outside the flat. 3. Very high density.	1. The outflow from the flat to the main road is constrained by a very narrow pathway. 2. The 2-way road has become 1-way as residents park their cars on the side of the road and 4 abandoned vehicles have been there for a long time. 3. The abandoned vehicles were around 7 to 12 years old based on the registration number. 4. Through interviews with residents, the vehicles have been there for a long time and the owners were unknown. 5. Abandoned vehicles have been covered with creeping trees and have started to rust. 6. Some of the abandoned vehicles have lost tires and components/parts in the car engine have been lost.
Residential Area 2	1. Medium-cost apartment. 2. Residents have 2 parking spaces. There was a parking space for visitors outside the apartment. 3. High density.	1. The road was very narrow as many vehicles were parked on the shoulder of the road. 2. Two abandoned cars in the parking area for visitors. 3. The age of the abandoned cars was between 8 to 12 years based on the vehicles registration numbers. 4. Through an interview with the apartment guard, 1 vehicle was owned by the resident there, but after the resident moved, the vehicle was left there and 1 other vehicle owner could not be identified. 5. Abandoned vehicles have been filled with creeping trees and started to rust.

(Contd.)

LOCATION	SURROUNDING SITUATION	OBSERVATIONS
Residential Area 3	1. Low-cost flats. 2. Residents have 1 parking space. If they have more than 1 vehicle, they have to park on the shoulder of the road. 3. High density.	1. The road was very narrow as many vehicles were parked on the shoulder of the road. 2. A total of 9 abandoned cars in the flat area. 3. The age of the abandoned cars was between 7 to 9 years based on the vehicle registration number. 4. Through an interview with the chairman of the residents' association, the abandoned cars have been there for two years. A warning notice has been pasted on the vehicle to have it moved or will be towed to the abandoned vehicle storage area. But the owner has not come forward to move the vehicle. The residents' association also cannot do anything since the cost of towing vehicles is very high. 5. Abandoned vehicles have started to be filled with creeping trees and have started to rust.
Car Repair Workshop 1	Located in an industrial area.	1. Many cars were parked in the workshop waiting for repairs. 2. It seemed that many cars were cut into several parts. 3. Interviews with workshop owners revealed that they have car repair skills and could use spare parts from cut cars (canabalised).
Car Repair Workshop 2	Located in an industrial area.	1. This workshop is focused on repairing cars using used spare parts. 2. Interview with the owner of the workshop found that they use the cannibalisation method by removing components from old vehicles and replacing them with vehicles that are being repaired. 3. The owner of the workshop informed that they acquired used vehicles that could not be operated at a cheap price. 4. These used vehicles are sold by the owner at the scrap metal price (waste price) to dispose of their vehicles.
Towed Vehicle (impounds) storage depot	1. Owned by the municipal council. 2. Stores vehicles that do not comply with road laws such as parking on the shoulder of the road and blocking the path, as well as abandoned vehicles.	1. The vehicle storage depot was almost full since many vehicles were left unclaimed by their owners. 2. Disposal process is difficult to implement and takes a long time between 6 to 12 months. Need to go through the following process: a. Issuing a removal notice. b. Checking the details of the owner, status of the vehicle whether or not there is still a sale and purchase agreement, stolen or has a criminal record. c. Issuance of notices to owners through advertisements in newspapers. d. Convening to obtain approval of asset seizure and disposal. e. Tender disposal process.

Table 1 On-Site Observation.

and can be seen as breeding grounds for mosquitoes and animals such as dogs. This demonstrates that the use of a large number of vehicles is not followed by effective management of abandoned cars. Based on the data obtained from a news story, there exists a considerable amount of discourse surrounding the potential implementation of an abandoned automobile policy. This policy, however, currently faces challenges since it is deemed premature due to the lack of societal preparedness. Given the absence of a specific policy addressing the issue of abandoned vehicles, the city council undertakes all responsibility for managing and keeping track of abandoned car for Kuala Lumpur areas. It was discovered that the city council was unable to enforce the law because there was no legislative authority that would permit them to take legal action against the owner of the abandoned car (Smith et al., 2004). This rendered them unable to do any sort of enforcement. The city council is only able to issue a simple warning notice; this is the full extent of its authority. It takes a lot of time and effort to decide instead of to carry out the disposal because this decision needs to be approved by a number of different parties, and the distribution of authority to take action is unclear. Therefore, from the scenario, the government should have implement vehicle end-of-life policy in order to resolve the issues of abandoned car and the issues of disposal of those vehicles.

Figure 2 Abandoned car in residential areas.

Figure 3 Car repair workshop.

Figure 4 Vehicle Impound Storage Depot.

CONCLUSION

This study indicated that people who work in urban areas such as Kuala Lumpur do not depend on public transport although the service is available. Although there is a lot of interest in reducing the amount of driving in urban areas, this study showed that individuals are driving to work. This shows that most people in Kuala Lumpur prefer to drive to work. Vehicle ownership is allowed in Kuala Lumpur even though it causes high traffic congestion and has become a habit for users. Since no policy restricts the use of vehicles in urban areas, individuals continue to prioritise the use of their own vehicles, thereby avoiding the necessity of relying on public transportation. Due to the substantial prevalence of vehicle usage particularly within Kuala Lumpur and Klang Valley areas, a notable consequence has been the proliferation of abandoned vehicles within residential areas, consequently contributing to an unattractive and unfavourable image. Hence, it is imperative to implement a policy that imposes restrictions on the number of vehicles while concurrently enhancing the provision of adequate public transportation services while tackling the issue of efficient vehicle disposal management. The implementation of this legislation has the potential to effectively mitigate traffic congestion while concurrently decreasing the prevalence of abandoned vehicles.

ETHICS AND CONSENT

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the National Defence University of Malaysia (NDUM) Research Ethics Committee (protocol code NDUM 07/2020) and approved on 19 November 2020.

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COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS

HM and AI contributed to conception and design of the study. AI analyse the content of each document and policy. HM, AI, RB and NS visited on-site locations and image gathering analysis. HM wrote the first draft of the manuscript. HM, RB and NS wrote sections of the manuscript. All authors contributed to manuscript revision, read and approved the submitted version.

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