ASEAN Engineering Journal

Full Paper

EVALUATING KEY FACTORS FOR THE PRIVATE VEHICLE INSPECTION (PVI) FRAMEWORK DEVELOPMENT IN MALAYSIA

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Article history
Received
26 March 2024
Received in revised form
07 September 2024
Accepted
11 September 2024
Published online
31 May 2025

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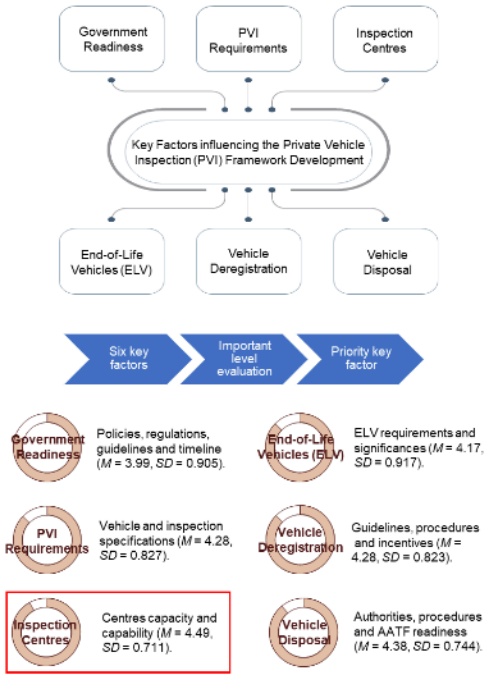
Graphical abstract



Abstract

Vehicles are one of the contributing factors to road crashes. Over the previous few decades, road crashes have claimed the lives of 6,540 people annually on average, and the government lost at least RM3.12 million for each life. To reduce the number of road fatalities, Private Vehicle Inspection (PVI) has been implemented voluntarily since 2013. PVI is an inspection carried out on private vehicles periodically to examine the vehicle condition and roadworthiness level. Although voluntary PVI has already been carried out, there is no appropriate framework for mandatory PVI implementation in the future as indicated in the National Automotive Policy (NAP), National Transport Policy (NTP) and Malaysia Road Safety Plan (MRSP). This study aimed to identify and analyse the key factors that influence the development of the PVI framework in Malaysia, to evaluate the importance level of each identified key factor and to identify the priority key factor. The key factors identified in this study were government readiness, PVI requirements, inspection centres, End-of-Life Vehicles (ELV), vehicle deregistration and vehicle disposal. The instrument used in this study consisted of a set of questionnaires containing 59 question items and using five-point Likert scales. Data were collected by distributing the questionnaires to six relevant ministries/agencies as the stakeholders. A total of 227 questionnaires out of 382 distributed were returned with a response rate of 59.4%. The results of the study were analysed using descriptive statistics and statistical tests. The study found that the important level of the key factors in influencing the PVI framework development was high. The study also revealed that the priority key factor identified was inspection centres. The results showed a moderate, positive correlation between inspection centres and PVI requirements, End-of-Life Vehicles (ELV), vehicle deregistration and vehicle disposal, which was statistically significant. The correlation between inspection centres and government readiness was weak, positive and statistically significant. The findings also showed a statistically significant difference in important levels depending on the combination of the priority key factor and other key factors. In conclusion, the most important key factor in developing the PVI framework in Malaysia was inspection centres. This study was limited to the responses from the perspective of the stakeholders, not including the public as a general respondent.

Keywords: Private Vehicle Inspection (PVI), PVI framework, influence key factors, important level, priority key factor, inspection centres

1.0 INTRODUCTION

In Malaysia, road fatalities are the leading cause of death. Over the previous few decades, road crashes have claimed the lives of 6,540 people annually on average. The economic impact is particularly noticeable in that the annual expenses of deaths and injuries in crashes are rising. Based on the value of statistical life (VSL) by the Malaysia Institute of Road Safety Research (MIROS) in 2018, the Malaysian government lost at least RM3.12 million for each life. These expenses comprise the recovery of the infrastructure, the loss of efficiency, and

medical expenses. In Great Britain in 2020, the average cost of road fatality is over 1.9 million British pounds [1].

Based on the study conducted by MIROS, there are three main factors contributing towards vehicle crashes which are human (80.60%), environment (13.20%) and vehicle (6.20%). Several other studies have also revealed these three contributing factors towards vehicle crashes, which human factor contributes the most [2,3,4,5,6]. Although the vehicle factor contributes the least, this factor should be considered and plays an important part in reducing vehicle crashes [2].

To reduce the domestic road fatalities index as well as minimise the level of injury among road users due to vehicle crashes, since 1995, all commercial vehicles were subjected to undergo mandatory periodic inspection at the appointed vehicle inspection centre which is PUSPAKOM. However, the periodic inspection is only mandatory for commercial vehicles which leaves a gap in terms of safety and roadworthiness for private vehicles. Private Vehicle Inspection (PVI) is an inspection conducted on private vehicles periodically to examine the vehicle condition and roadworthiness level. No mandatory PVI means the level of vehicle roadworthiness cannot be ensured. To ensure this issue is slowly raised to the public as it involves a huge number of vehicles and costs to the public, the government has initiated the voluntary PVI policy called 'Voluntary Vehicle Inspection Program (VVIP)' under the National Automotive Policy (NAP) 2014 [7]. Apart from NAP, National Transport Policy (NTP) 2019-2030 and Malaysia Road Safety Plan (MRSP) 2022-2030 have also emphasized Voluntary Private Vehicle Inspection (PVI) [8,9].

Several studies have revealed that vehicle inspection in other countries such as the European Union (EU), United States (US) and New Zealand [3,10,11,12]. In the EU, each EU Member State was required to implement periodic vehicle inspection. Each Member State provides a periodic vehicle inspection system based on the same regulations, which include the categorization of defects and the car assessment results.

A study on the automotive ecosystem has also revealed that Malaysia is in a bad state due to a lack of roadworthiness inspections, ELV, and vehicle ownership situations [13]. In Malaysia, the number of vehicles registered each year exceeds the number of vehicles deregistered. According to Road Transport Department (RTD) statistics, less than 11,000 vehicles were administratively deregistered. This rationale demonstrates that ELV adoption is a critical problem for the government to consider to avoid a rise in fewer roadworthy cars, increasing the risk of road fatality or injury in a crash. ELV can be pre-implemented through the introduction of vehicle roadworthiness inspection which is PVI [6]. Authorized Automotive Treatment Facilities (AATF) is a facility in Malaysia that disposes of components, particularly those containing scheduled waste from vehicles [14]. AATF will also be involved in managing the ELV system for ELV vehicles which are not roadworthy to be used on the road.

Although the NAP, NTP and MRSP underlined the need for PVI, vehicle inspection centres like PUSPAKOM have already implemented the voluntary PVI in their way as there is no clear direction from the government towards the implementation of mandatory PVI. Government readiness is one of the challenges and factors to implement PVI and an appropriate framework is required for the sustainability of PVI [6]. The key factors that influence the development of the PVI framework need to be identified and evaluated. Therefore, this study was conducted to identify and analyse the key factors that influence the development of the PVI framework, to evaluate the important level of each identified key factor and to identify the priority key factor. From the literature review, there were six key factors that influence the development of PVI framework in Malaysia identified namely government readiness, PVI requirements, inspection centres, End-of-Life Vehicles (ELV), vehicle deregistration, and vehicle disposal.

2.0 METHODOLOGY

This study used a web-based survey to seek participants' responses to the important level of the key factors that influence the development of the PVI framework in Malaysia. It took about 10 to 15 minutes to complete the web-based survey. The survey was administered online between 14th September and 31st October 2023. A total of 227 respondents from six relevant ministries/agencies as the stakeholders answered the questionnaire. The questionnaire consisted of 10 sections. Section A contains questions about demographics, working experience, driving experience, and voluntary PVI experience. Section B and Section C of the questionnaire try to assess the understanding of PVI and PVI-related policies using a Likert scale consisting of 5 possible responses (Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree). Section D to Section I tries to evaluate the importance level of the key factors that influence the development of the PVI framework using the Likert Scale consisting of 5 possible responses (Very Unimportant, Somewhat Unimportant, Neutral, Somewhat Important and Very Important). In addition, section E has three additional multiple-choice questions on vehicle age, inspection frequency and inspection fee. Lastly, in Section J, respondents are required to give their opinions and comments on the mandatory PVI implementation timeline.

A pilot study was conducted among a small group of respondents before the data collection process began. This was done to test and ensure the questionnaire's reliability and validity to ask the respondents. Besides, the information was needed to achieve all the objectives of the study. Data entry was performed by a researcher into the database using IBM Statistical Package for Social Science (SPSS) software version 29. Data analysis in the study was done using descriptive statistical analysis. Through this descriptive statistical analysis, the results are obtained in the form of frequency, mean and standard deviation. Each item will be analysed, grouped by aspect and presented in the form of mean and standard deviation tables. This study used non-parametric statistical analysis to analyse the ordinal data collected from the questionnaire.

3.0 RESULTS AND DISCUSSION

3.1 Demographic Information

Based on the data collected from the questionnaire, 83.3% of the respondents were male and female approximately 16.7%. More than half of the respondents were in the age group of 31 to 43 years old (64.3%), followed by the age group of 44 to 55 years old (27.3%). In terms of highest academic qualification,

the majority of the respondents had at least a Diploma (82.8%), whereas the majority had working experience more than 10 years old (84.6%). Furthermore, almost 50% of all respondents who answered the questionnaire were working with the Road Transport Department (45.4%), followed by PUSPAKOM (27.3%). In terms of driving experience, the majority of the respondents had more than 15 years of driving experience (77.6%) and approximately less than 1% of respondents had driving experience of one to five years. For voluntary PVI experience, more than half of the respondents (54.6%) had been involved in voluntary PVI.

3.2 Key Factors that Influence the Development of PVI Framework

3.2.1 Government Readiness

In terms of government readiness important level, the study achieved an average mean score of 3.99 (*SD* = 0.905). This indicates that government readiness is an important key factor influencing the development of the PVI framework. According to Table 1, two items (Items D1 and D2) showed a mean value above 4.0. The respondents thought policy implementation and availability of PVI standards and regulations are important in developing the PVI framework. Three items had mean values at the medium level: Item D3, availability of PVI Guidelines (Guidelines for PVI Implementation) (M = 3.98), Item D4, analysis of available voluntary PVI inspection data to determine the inspection trend and failure rates (M = 3.97), and Item D5, timeline for mandatory PVI implementation (M = 3.94). This means that the respondents felt PVI guidelines, inspection data analysis and implementation timeline are quite important in the PVI framework development.

Table 1 Mean and Standard Deviation of Government Readiness

Item	Description	Mean	Standard Deviation
D1	Policy implementation (National Automotive Policy, National Transport Policy, Malaysia Road Safety Plan)	4.04	0.902
D2	Availability of PVI standards and regulations (Malaysian Standard: MS for Roadworthiness Inspection)	4.01	0.912
D3	Availability of PVI Guidelines (Guidelines for PVI Implementation)	3.98	0.872
D4	Analysis of available voluntary PVI inspection data to determine the inspection trend and failure rates	3.97	0.902
D5	Timeline for mandatory PVI implementation	3.94	0.939
	Average	3.99	0.905

3.2.2 PVI Requirements

The second key factor studied in influencing the development of the PVI framework is PVI requirements. Table 2 shows the data analysis of important levels of PVI requirements. There are nine items designed to test the important level of PVI requirements in influencing the development of the PVI framework among the stakeholders. The results show that the PVI requirements key factor recorded an average mean score of 4.28 (*SD* = 0.827). The findings also show that all items had a mean score at the high level (except for one item with a mean value at the medium level: Item E8, re-inspection fee (fee incurred to re-inspect the failed items only) (M = 3.96). This means that the respondents were satisfied with the importance of the re-inspection fee as it will not impact the whole public. Eight items (Items 1, 2, 3, 4, 5, 6, 7, and 9) showed a mean value above 4.0. This indicates that PVI requirements are an important key factor in developing the PVI framework. Respondents felt that vehicle types, vehicle age, inspection items, inspection methods, inspection types and inspection frequency are important as PVI requirements to make sure the PVI framework is comprehensively developed.

Table 2 Mean and Standard Deviation of PVI Requirements

Item	Description	Mean	Standard Deviation
E1	Inspection types (initial inspection, periodic inspection etc.)	4.33	0.764
E2	Inspection items (brake, side slip, above carriage etc.)	4.52	0.647
E3	Inspection methods (automated, visual etc.)	4.38	0.702
E4	Vehicle types (Motorcycle, Sedan Car, MPV, SUV etc.)	4.39	0.741
E5	Vehicle age (age to start undergoing PVI)	4.39	0.759
E6	Inspection frequency (how frequently a vehicle needs to be inspected)	4.28	0.804
E7	Inspection fee	4.11	1.003
E8	Re-inspection fee (fee incurred to re-inspect the failed items only)	3.96	1.063
E9	Control of the inspection fee and re-inspection fee by the government	4.18	0.963
	Average	4.28	0.827

For multiple choice questions, the findings on the vehicle age show that more than half of the respondents suggested that PVI should be implemented for vehicles aged more than 7 years (51.1%), followed by the vehicle age of 5 years. The results on PVI frequency show that approximately 27% of the respondents thought PVI should be conducted every year and about 25% of the respondents chose the PVI frequency of every 2 years. The findings on the inspection fee found that about 28% of the respondents chose an inspection fee of between RM21 to RM30 and about 16% of the respondents chose an inspection fee of between RM31 to RM40.

3.2.3 Inspection Centres

The third key factor is inspection centres in influencing the development of the PVI framework. The results show that the key factor of inspection centres recorded an average mean score of 4.49 (*SD* = 0.711), as shown in Table 3. The finding also shows that all items had a mean score at the high level. There were two items with the highest mean score (Item F6, inspection equipment performance and Item F7, inspection personnel competency). These items recorded a mean score of 4.56. This indicates that inspection equipment performance and inspection personnel competency are very important in inspection centres key factor in influencing the PVI framework development.

Table 3 Mean and Standard Deviation of Inspection Centres

Item	Description	Mean	Standard Deviation
F1	Number of centres	4.52	0.706
F2	Location of centres	4.54	0.692
F3	Types of centres (permanent, mobile, workshops and service centres as centre, etc.)	4.41	0.773
F4	Types of operations (inspection, repair, services etc.)	4.36	0.765
F5	Operations/services hours	4.47	0.687
F6	Inspection equipment performance	4.56	0.672
F7	Inspection personnel competency	4.56	0.684
	Average	4.49	0.711

3.2.4 End-of-Life Vehicles (ELV)

The fourth key factor studied is End-of-Life Vehicles (ELV). Table 4 shows the data analysis of ELV key factor in influencing the PVI framework development. There are seven items to measure the important level of ELV in the PVI framework development among the stakeholders. The ELV key factor recorded an average mean score of 4.17 (*SD* = 0.917). This shows that ELV key factor affects PVI framework development at a high level. The findings show that all items had a mean score at the high level. This indicates that all items in ELV key factor are important in influencing the PVI framework development.

Table 4 Mean and Standard Deviation of End-of-Life Vehicles (ELV)

Item	Description	Mean	Standard Deviation
G1	Vehicle age (how old a vehicle started to be determined as ELV)	4.21	0.953
G2	PVI as a prerequisite requirement for ELV determination	4.26	0.826
G3	Number of PVI re-inspections before ELV determination (how many re-inspections allowed)	4.08	0.909
G4	ELV will reduce the number of abandoned vehicles	4.29	0.899
G5	ELV will support the national automotive ecosystem	4.30	0.830
G6	ELV will reduce the number of road accidents caused by old vehicles	4.01	1.030
G7	ELV will make the road safer	4.06	0.969
	Average	4.17	0.917

3.2.5 Vehicle Deregistration

The fifth key factor is vehicle deregistration. The vehicle deregistration key factor recorded an average mean score of 4.28 (*SD* = 0.823), as shown in Table 5. This shows that vehicle deregistration is important in influencing the development of the PVI framework. All items recorded a mean score above 4.00. This indicates that the respondents agreed that deregistration guidelines, procedure awareness, mandatory deregistration and incentives are important items in the PVI framework development.

Table 5 Mean and Standard Deviation of Vehicle Deregistration (ELV)

Item	Description	Mean	Standard Deviation
H1	Availability of deregistration guidelines	4.28	0.793
H2	Deregistration procedure awareness	4.29	0.783
H3	Mandatory deregistration	4.20	0.873
H4	Incentives such as new car rebate or insurance premium discount after deregistration	4.36	0.842
	Average	4.28	0.823

3.2.6 Vehicle Disposal

The last key factor studied is the vehicle disposal key factor. Table 6 shows the data analysis of vehicle disposal important level. There are five items designed to test the important level of vehicle disposal in influencing the PVI framework among the stakeholders. The vehicle disposal key factor recorded an average mean score of 4.38 and a standard deviation of 0.744. This shows that the vehicle disposal key factor in influencing the development of the PVI framework is at a high level. All items had a high mean score. This means that all items in vehicle disposal key factors are important in the development of the PVI framework.

Table 6 Mean and Standard Deviation of Vehicle Disposal (ELV) (N = 227)

Item	Description	Mean	Standard Deviation
I1	Disposal authorities' awareness	4.35	0.752
I2	Disposal procedure awareness	4.36	0.754
I3	Authorized Automotive Treatment Facilities (AATF) as disposal facilities readiness	4.43	0.727
I4	Number of AATF	4.38	0.739
I5	Location of AATF	4.36	0.748
	Average	4.38	0.744

3.3 Identifying the Priority Key Factor

Table 7 shows the average mean and standard deviation for six key factors that influence the development of the PVI framework, based on the average mean score from the highest to the lowest. The results show that the inspection centres key factor is the priority key factor, which had the highest average mean score in the view of the stakeholders. This means that inspection centres are the most important key factor in influencing the development of the PVI framework.

Table 7 Average Mean and Standard Deviation for Six Key Factors

Section	Key Factor	Average Mean	Standard Deviation
F	Inspection Centres	4.49	0.711
I	Vehicle Disposal	4.38	0.744
E	PVI Requirements	4.28	0.827
H	Vehicle Deregistration	4.28	0.823
G	End-of-Life Vehicles (ELV)	4.17	0.917
D	Government Readiness	3.99	0.905

3.4 Correlation Between Priority Key Factor and Other Key Factors

In addition, the non-parametric test which is the Spearman's rank correlation was computed to assess the correlation between the priority key factor (inspection centres) and other key factors, and the results are shown in Table 8. The results show that there was a moderate, positive correlation between inspection centres and PVI requirements importance level, which was statistically significant ($r_s(225) = .50$, $p < .001$). There was also a moderate, positive correlation between inspection centres and End-of-Life Vehicles (ELV) importance level, which was statistically significant ($r_s(225) = .55$, $p < .001$). The correlation between inspection centres and vehicle deregistration importance level was moderate, positive, and statistically significant ($r_s(225) = .53$, $p < .001$). The correlation between inspection centres and vehicle disposal importance level was also moderate, positive, and statistically significant ($r_s(225) = .56$, $p < .001$). The findings also show a weak, positive correlation between inspection centres and government readiness importance level, which was statistically significant ($r_s(225) = .28$, $p < .001$).

Table 8 Spearman Correlations among Key Factors' Importance Level

Variable	*n*	*M*	*SD*	1	2	3	4	5	6
1. Government Readiness	227	3.99	0.83	–					
2. PVI Requirements	227	4.28	0.64	.46**	–				
3. Inspection Centres	227	4.49	0.64	.28**	.50**	–			
4. End-of-Life Vehicles (ELV)	227	4.17	0.74	.48**	.55**	.55**	–		
5. Vehicle Deregistration	227	4.28	0.72	.47**	.58**	.53**	.65**	–	
6. Vehicle Disposal	227	4.38	0.70	.46**	.50**	.56**	.61**	.66**	–

**. Correlation is significant at the 0.01 level (2-tailed)

3.5 Significant Difference Between Priority Key Factor and Other Key Factor

Another non-parametric test which is the Friedman test was also conducted to indicate whether the priority key factor (inspection centres) is significantly different from other key factors on a skewed variable of interest, and the results show that there was a statistically significant difference in importance level depending on the combination of the priority key factor and other key factors, $\chi^2(5) = 103.540$, $p < .001$. To determine where the differences occur, post hoc analysis with Wilcoxon Signed Ranks tests was computed on the different combinations of the priority key factor (inspection centres) and other key factors. This test was conducted with a Bonferroni correction applied, resulting in a significance level set at $p < .003$. Median (IQR) importance levels for government readiness, PVI requirements, inspection centres, End-of-Life Vehicles (ELV), vehicle deregistration and vehicle disposal were 4 (3.4 to 4.8), 4.33 (4 to 4.78), 4.71 (4 to 5), 4.14 (3.86 to 4.86), 4.25 (4 to 5) and 4.6 (4 to 5), respectively. The Wilcoxon Signed Ranks test results are shown in Table 9. The results show that there was no significant difference between vehicle disposal and inspection centres ($Z = -1.947$, $p = .052$). However, there were statistically significant differences in importance level in inspection centres vs. government readiness ($Z = -7.980$, $p < .001$), ELV vs. inspection centres ($Z = -6.828$, $p < .001$), inspection centres vs. PVI requirements ($Z = -4.837$, $p < .001$), and vehicle deregistration vs. inspection centres ($Z = -4.635$, $p < .001$).

Table 9 Wilcoxon Signed Ranks Test Results

Combination of Inspection Centres and other Key Factors	Z	*p*
Inspection Centres - Government Readiness	-7.980[a]	< .001
Inspection Centres - PVI Requirements	-4.837[a]	< .001
End-of-Life Vehicles (ELV) - Inspection Centres	-6.828[b]	< .001
Vehicle Deregistration - Inspection Centres	-4.635[b]	< .001
Vehicle Disposal - Inspection Centres	-1.947[b]	.052

From the results of the analysis, it was found that the mean score of the government readiness key factor that influence the development of PVI framework in Malaysia was 3.99. This shows that the respondents reported positive feedback towards the importance of this key factor. The findings of this study are in line with that of [6], who explained that government policies remain the key to success in the implementation of PVI. According to them, PVI standards and regulations need to be developed. Thus, Malaysian Standard MS 2729:2023 (Used private motor vehicle – Roadworthiness – Requirements for inspection) was issued in June 2023 and is

expected to be gazette by the government to implement the mandatory Private Vehicle Inspection (PVI) in the future [15]. The finding on the importance of voluntary PVI data is in line with that of [5], who did an analysis of voluntary PVI data and found that brake failure contributed the most. The PVI requirements key factor recorded a mean score of 4.28. This indicates that this key factor is important in developing the PVI framework. The findings on the age of the vehicle to start PVI and PVI frequency in this study are in line with that of [16], who discovered the PVI frequency suggested by the respondents was annually (after year 5 of registration). In contrast, a study found that most of the respondents chose annually after a vehicle aged 9 years old [17]. In terms of inspection fees, approximately 28% of the respondents suggested between RM21 to RM30, and 16% of them chose between RM31 to RM40. This finding is in line with that of [16], who have also discovered that the majority of the respondents chose the inspection fee between RM20 to RM40. [5] discovered that the braking system and above carriage contributed the most to the inspection failure. This finding supports the finding on the importance of inspection items in PVI, which recorded the highest mean value in PVI requirements key factor, with 4.52.

Next, the inspection centres key factor recorded a mean score of 4.49 which is the highest among all six key factors. This indicates that this key factor is very important and will also influence the development of the PVI framework. The findings of this study are supported by [5], who found that the respondents suggested doing PVI in various kinds of centres such as PUSPAKOM, manufacturer service centres, vehicle workshops, road-side inspection and others. [6,16] found that inspection equipment needs to be upgraded in line with vehicle technology advancement. This statement supports the finding on the importance of inspection equipment performance. The finding on the importance level of inspection personnel competency with a mean value of 4.56 shows that personnel competency is very important. This finding is supported by [18], who found that automobile inspection competence and ability are the most important items for vehicle inspectors of PVI. The End-of-Life Vehicles (ELV) key factor recorded a mean score of 4.17. This shows that ELV plays an important role in influencing the development of the PVI framework. The finding on the importance of vehicle age to start ELV is supported by [17], who found that the majority of the respondents chose vehicle age after 15 years as the vehicle retirement age. In contrast, a study discovered that 44.9% of the respondents chose no ELV for private vehicles [17]. The importance of PVI as a prerequisite requirement to ELV determination is supported by [6], who concluded that the absence of PVI in Malaysia's automotive ecosystem will cause a failure in ELV implementation. This study also found that ELV is important in reducing the number of abandoned vehicles and this finding is supported by [17], who stated that 83% of the respondents agreed there is a need to dispose of abandoned vehicles.

The vehicle deregistration key factor recorded a mean score of 4.28. This result indicates that the PVI framework is significantly influenced by vehicle deregistration. The findings of this study are supported by [19], who revealed that lack of PVI, ELV and vehicle deregistration contributed to the unhealthy automotive ecosystem in Malaysia. PVI is important to increase the number of vehicle deregistrations. In the year 2022, only 31 vehicles were deregistered administratively, supporting the finding on the importance of deregistration guidelines, procedure awareness as well as mandatory deregistration. Incentives such as new car rebates or insurance premium discounts after deregistration are important with a mean value of 4.36. This finding is supported by [6,17], who found that the government should give incentives, rebates or discounts to the vehicle owner for ELV and after deregistration. However, to make this ELV and vehicle deregistration implemented successfully, a vehicle disposal policy including procedures and facilities must be in place for the implementation. The last key factor, which is vehicle disposal, recorded a mean score of 4.38. This shows that the vehicle disposal key factor plays an important role in influencing the PVI framework. This finding is in line with that of [20,21,22], who found that ELV recycling and dismantling facilities readiness are very important in ELV management systems and vehicle disposal activities. [23] revealed that 81% of the respondents did not know the ELV laws including disposal procedures, supporting the importance of disposal authorities' and disposal procedures awareness in this key factor. The sufficient number and location of AATF as disposal facilities are important in ensuring the successful implementation of PVI, ELV, vehicle deregistration and vehicle disposal.

In terms of correlation, there were a moderate, positive correlation between inspection centres and PVI requirements, End-of-Life Vehicles (ELV), vehicle deregistration and vehicle disposal, which is statistically significant. These findings indicate that as the importance level for inspection centres increases, there will be a moderate increase in the importance level for PVI requirements, ELV, vehicle deregistration, and vehicle disposal. The correlation between inspection centres and government readiness is weak, positive and statistically significant. This means any increase in inspection centres importance level will result in a small increase in government readiness.

In terms of significant difference, there was a statistically significant difference in importance level depending on the combination of the priority key factor and other key factors, $\chi^2(5) = 103.540$, $p < .001$. A statistically significant difference was found between inspection centres and government readiness. This shows that the respondents felt that inspection centres are more important and must be made available and ready before implementation. They thought that the government should be ready during the initiation of PVI in NAP 2014. There was also a statistically significant difference between ELV and inspection centres. This is likely due to the different influence and function of both key factors. The respondents thought ELV is a post-inspection matter as inspection centres are a pre-inspection thing that must be prioritized. The statistically significant difference between inspection centres and PVI requirements is perhaps due to different feedback from the respondents. Some of the respondents thought PVI requirements are more important, especially involving vehicle age and inspection items. Other respondents thought that inspection centres are more important than PVI requirements, especially the number and location of the centres, due to the large volume of private vehicles. The statistically significant difference between vehicle deregistration and inspection centres is perhaps due to the different influence and function of both key factors. The respondents thought vehicle deregistration is a post-inspection matter like ELV but inspection centres are a pre-inspection

thing that will determine the status of a vehicle whether it is roadworthy or needs to be deregistered and disposed of.

4.0 CONCLUSION

The development of the PVI framework was influenced by six identified key factors namely government readiness, PVI requirements, inspection centres, End-of-Life Vehicles (ELV), vehicle deregistration, and vehicle disposal. This study found that the importance level of the key factors in influencing the development of the PVI framework was high. The study also revealed that the inspection centres key factor was the priority key factor identified from the evaluation of the importance level. The respondents felt that the inspection centres is the most important key factor that the government should focus on when developing the PVI framework. The findings of this study show that there was a correlation between the priority key factor (inspection centres) and other key factors. The correlations between inspection centres and PVI requirements, ELV, vehicle deregistration and vehicle disposal were moderate, positive and statistically significant. There was a weak, positive correlation between inspection centres and government readiness, but statistically significant. This study also found that there was a significant difference in importance level depending on the combination of the priority key factor (inspection centres) and other key factors. Wilcoxon Signed Ranks tests identified that there was no statistically significant difference in importance level between vehicle disposal and inspection centres. However, there were statistically significant differences in importance level in inspection centres vs. government readiness, ELV vs. inspection centres, inspection centres vs. PVI requirements, and vehicle deregistration vs. inspection centres.

Given that the scope of this study only focuses on the importance level of each key factor from the perspective of the stakeholders, the researcher felt that a similar study could also be conducted from the perspective of the public as a general vehicle owner. The priority key factor identified from the perspective of the public can be analysed and compared to see any significant difference between these two groups. Therefore, it is recommended that a comparative study on the importance level of the key factors that influence the development of the PVI framework among the stakeholders and public can be conducted. Inspection centres as the priority key factor identified from this study can be further studied to analyse the elements in inspection centres-related items. A study to analyse the inspection centres' capacity and capability can be conducted together with a comparative study on the inspection equipment and personnel performance between Malaysia and other countries. In addition, public perception of the inspection centres' service deliverables towards the mandatory PVI implementation can be studied for further research.

Acknowledgement

We would like to thank Universiti Putra Malaysia (UPM), Ministry of Transport (MOT), Road Transport Department (RTD), Malaysian Institute of Road Safety Research (MIROS), Department of Environment (DOE), Malaysia Automotive, Robotics and IoT Institute (MARii) and PUSPAKOM for their helpful feedback and support.

Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper

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