The study on the level of knowledge of the approving authority in the practice of traffic impact assessment (TIA) report submission in Malaysia: case study in Johor

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Abstract. Road Engineering Association of Malaysia (REAM) gazetted traffic impact Assessment (TIA) Guidelines in 2011. TIA is a systematic and scientific process used as early identification to analyse the traffic impacts generated by a development and control with necessary mitigation measures. This study aims to identify level of knowledge of the Approving Authority in the practice of TIA report submission by questionnaire distribution and the data collected is analysed using Statistical Package for the Social Sciences software. This research study focuses on the Approving Authority because of their involvement in the evaluation of TIA report and approval of planning proposal. Lacking of knowledge in TIA understanding will cause ineffectiveness in the TIA implementation. Hence, the scope for this research is the local authorities and the Public Work Department in the state of Johor, Malaysia. This will contribute to the significant of the understanding of the Approving Authority in the practice of TIA and to determine any improvements required to effectively implementing TIA in all stages. This study shows obvious differences between the level of knowledge state PWD (95%) and the local authority (51%) that hinders the intention to have the local authority to act as the Approving Authority in TIA.

1. Introduction
Traffic Impact Assessment is a systematic and scientific process used as the early identification to foresee traffic impact generated from a development and to mitigate the impact by providing practical solutions. A development will invariably bring about unwanted impact to the traffic of the developing location and the surrounding area. At some point, the cumulative development will generate additional vehicular trips that will adversely affect the traffic condition of the prevailing road network. In order to address this matter, Traffic Impact Assessment is a common platform for the authority to ensure the development of the town is in controlled orderly manner. Potential issues, such as, congestion, can cause hazard to the safety of users on the road. Faheem 2012 stated that traffic congestion causes delayed in travel times, air pollution and accidents that are more cost-consuming [1].
Lack of knowledge has been a concerning issue in the practice of TIA, the success of the implementation of TIA process greatly depends on the expert or technicians in the government and consultants having sufficient knowledge on TIA. Lack of potential staffs in the local offices, limited experts in private sector and only a few famous companies have traffic engineers experienced in TIA will leads to cases where the report is approved despite the obvious overestimated of the traffic analysis. This also hinders the intention to distribute the responsibility to handle TIA to local agencies to control land developments. Therefore, government must train their people to develop enough knowledge to accomplish the target in efficiently implementing TIA. It is important that assessments are not viewed merely as a hurdle for development approval. With no incentive to modify the existing TIA, this may result in the lack of accountability for the development due to assumptions and decisions inherent in the preparation of TIA. Therefore, to accomplish an efficient implementation of TIA, the conduct of TIA must have a well-developed human resource in the related organisation such as the approving authority in ensuring the integrity of the practice of TIA. The lack of knowledge of the involving parties will be a hinder to produce meaningful TIA [2]-[5].

1.1. Traffic Impact Assessment in Malaysia

Malaysia has applied Traffic Impact Assessment (TIA) since early 90’, with the first draft TIA Guidelines proposed in 2005. In 2011, Road Engineering Association of Malaysia (REAM) gazetted the latest guidelines. TIA report is an element in the Development Proposal Report in compliance with section 21A of the town and Country Planning ACT 1976 (ACT172). The guidelines ensure the implementation of TIA is uniform throughout the country with the standardised preparation of TIA reports. The report will provide the necessary technical links with the Environmental Impact Assessment and the Road Safety Audit. Figure 1 illustrates the TIA process for the application of a development planning permission in Malaysia. From the figure, the approving authority will proceed with planning approval after evaluation and acceptance of the TIA report. In the guidelines, the approving authority defined as the local authority and the road authority who had the authority to act according to the law. Besides, those eligible to do the professional TIA report must be accredited TIA Assessor registered with the Board of Engineers, Malaysia and meets the criteria for accreditation as listed in the guidelines. The main aim of implementing TIA in Malaysia is to have a professional evaluation on the adverse impact on the proposed development and its surrounding the traffic and transportation network. Then, execution of the appropriate mitigation measures to relief the forecasted impact to restore the level of service (LOS) of the road condition to its baseline. The baseline of the road condition should be a minimum of LOS D [6]-[8].

Transportation is an important daily mobilisation, with the unceasing development, traffic accidents and road congestion have become more significant and pronounce issues. Malaysia as a developing country is no exceptionally for this issues. Johor occupied the second largest populated state in Peninsular but also having the highest number of death caused by road accident. The best is to intercept these traffic safety problems at the initial stage of planning and this can be achieved through well-coordinated traffic impact management. Given Malaysia have well-established Guidelines for TIA since 2011 as a planning tools to control the traffic impacts from developments, however the number of road accident are still high. With Federal Route 50, FT050, connecting Batu Pahat-Kluang-Mersing recorded the highest number of accidents in the state of Johor [9]. Thus, Johor is selected as the case study with the district of Batu Pahat including the town of Yong Peng and the district of Kulai as the study radius to conduct this research. This research aims to identify the level of knowledge of the Approving Authority in the practice of TIA report submission by using questionnaire method and to analyse the collected questionnaire data using Statistical Package for the Social Sciences software.
2. Materials and Methods
Johor as the study scope for this research, Table 1 depicts the respective location where the questionnaire is distributed. Department such as the road department and technical team that involved in the practice of TIA is chosen as the respondents, a total 44 respondents is collected. Pilot study is conducted to ensure the data collected is able to achieved the aim of this study, modifications are done during the actual research by changing the format of testing the respondents’ level of knowledge using true and false statements. The analysis is done using Statistical Package for the Social Sciences software to relate to the demographic characteristics of the respondents.

![Diagram](image-url)

**Figure 1.** TIA in planning permission application process. Source: [6]

### Table 1. Scope of Study

| Department                        | Name                                          |
|-----------------------------------|-----------------------------------------------|
| Local authorities                | Majlis Perbandaran Kulai (MPK)                |
|                                   | Majlis Perbandaran Batu Pahat (MPBP)          |
|                                   | Majlis Daerah Yong Peng (MDYP)                |
| District Public Work Department  | JKR(D) Kulai                                  |
| State Public Work Department     | JKR (S) Johor (Road Department)               |
3. Results and Analysis

![Graph showing level of knowledge in the practice of TIA report submission against R-square regression]

**Table 2. Variables tested against level of knowledge**

| Level of knowledge in the practice of TIA report submission against | R-square regression |
|-------------------------------------------------------------------|---------------------|
| Age                                                               | 0.014               |
| Education Level                                                   | 0.015               |
| Working experience in current designation or department           | 0.151               |
| Working experience on profession regarding TIA                    | 0.105               |

R-square regression closer to 1 indicates that there are relationships between the variables, the values for R-square obtained from the analysis are closer to 0. This shows the level of knowledge is regardless of education level, working experience and age as presented in Table 2. In Figure 2, the state PWD achieved outstanding level of knowledge in the practice of TIA report submission of 95%. While, the district PWD, district council and municipal council score 51% in average. The obvious differences between the level of knowledge is an obstruction to the intentions of implementing TIA locally.

![Graph showing score based on general and critical questions]

**Figure 3. Level of knowledge based on question categories**
The common question that was incorrect by the state PWD is a general question regarding the requirement of TIA presented in Figure 3. The only question that was incorrect is regarding the requirement of TIA. In the Malaysia TIA guidelines stated that not all development requires TIA especially in rural areas, only required when the development meets the trigger level as in Table 3. However all the respondents from state PWD answered true that all development proposals need TIA to control the negative traffic impacts. These is also one of the issue discussed in [10], TIA study should include all study region, rural and urban because as development progress, the traffic impacts from the rural will be more pronounce and severe.

Table 3. Criteria and corresponding trigger levels to warrant TIA. Source: [6]

| No | Criteria                                                                 | Trigger Levels                              |
|----|---------------------------------------------------------------------------|---------------------------------------------|
| 1  | Peak Hour Trip Generation (Commuter peak)                                 | 150 added vehicles per hour (2-Way)         |
| 2  | Off-Peak Hour Trip Generation (Generator peak occurs at the off-peak period) | 200 added vehicles per hour (2-Way)         |
| 3  | Size of residential development                                           | 200 dwelling units                          |
| 4  | Size of Commercial development                                            | 45,500 sq.ft. (gross floor area)            |

Note: Trip Generation Rates shall be based on the Malaysian Trip Generation Manual published by the Highway Planning Unit of the Ministry of Works, Malaysia.

Whereas for the other departments, the results are relatively low (33%), especially on the 7 critical questions regarding the role of Approving Authority, the role of TIA Assessor, the criteria of warranting TIA and the baseline condition after mitigation measure. This questions are the basic principle and must know for the practice of TIA. Other 13 questions are the general questions which consist of the purpose of TIA and others related questions after the TIA report is in progress.

Figure 4. Approval of TIA report

The state PWD agrees that TIA report approval should be done in a meeting. However, most approval are given by their intermediate officer, 60% as shown in Figure 4. The Malaysia TIA guidelines stated the local authority or the road authority is given the power to act according to the law regarding TIA. This statement is agreed as 91.4% of the respondents agreed that the current legal jurisdiction has provided them the authority. This will affects the implementation of TIA as many is unclear about the
role in TIA. This will also arise the question of the doubt whether the report is evaluated sufficiently with one’s knowledge as majority of them scored average level of knowledge.

![Figure 5. Duration for the approval for TIA report submission](image)

The purpose of having Guidelines so process for approval within 14 days. Figure 5 shows 26% of the reports are approved within 2 weeks. Delay could be due to the problems by the consultant or the developer (48.3%), lack of in-house capacity to evaluate the reports (25.7%) and postpone of regular meeting (14.3%) presented in Table 4.

| Type of problem                              | Percent |
|---------------------------------------------|---------|
| Problem by the consultant or developer      | 48.3    |
| Lack of in-house capacity to evaluate the reports | 25.7    |
| Postpone of regular meetings                | 14.3    |

Table 4. Problems in TIA report submission

About 85.7% recommended monitoring programme after TIA report submission is approved, this will help continue monitor the traffic impacts generated by the development and provide necessary data for future development. 85.7% suggested to have compulsory courses or programmes on TIA organised by road provider such as Public Work Department conducted by the Road Engineering Association of Malaysia or Institution of Engineers, held constantly to train the personnel involved in TIA. 91.4% agree to have competency test for the Approving Authority. By having capable and accredited TIA Approving Authority, the implementation of TIA could be more effective as the Approving Authority are able to practice TIA independently.

Due to the lack of information in the Malaysia TIA Guidelines, in the *Garis Panduan untuk Memproses Permohonan Pembangunan Tepi Jalan Persekutuan* clearly stated that reports are to be processed within 14 days which include the TIA reports [11]. However in the Malaysia TIA guideline the duration for the approval of TIA report is not stated and there are no referencing in the guideline to direct users to the related details regarding this matter. This is agreeable to the improvement of more detailed information to evaluate the TIA report submission and having checklist in the TIA Guidelines (91.4% respectively), Table 5. This will assist the Approving Authority in the completion of TIA report submission approval within 14 days.
Table 5. Improvements

| No | Agreement to the following statement                                                                 | %  |
|----|---------------------------------------------------------------------------------------------------------------------------------|----|
| 1  | Is the current legal jurisdiction provides the authority the power to compel the submission of TIA reports when being challenged the relevant statutes? | 91.4 |
| 2  | Compulsory training courses or programmes on traffic impact assessment should be held constantly to train personnel involved in this department. | 85.7 |
| 3  | A board should be created with all the important members especially with the present of TIA consultant or assessor to evaluate TIA reports. | 91.4 |
| 4  | Competency test should be held for those who wish to be the Authority that approve the TIA report submission.                    | 85.7 |
| 5  | The current guidelines should provide more detailed information on the method to evaluate the TIA report submission.             | 91.4 |
| 6  | Adding checklist to the current TIA guidelines to standardise the evaluation process.                                           | 91.4 |
| 7  | Monitoring programme to continue monitor the traffic impact after the TIA report submission is approved.                         | 85.7 |

TIA current process was lack of reviewing by the authorities, meanwhile the guidelines should be clearly defined. Sustainable transportation system for a town can be achieved by a coordinated effort of the stakeholders, namely the local authority (the municipality), project developers, practicing traffic consultants and the public at large. Main problem is the authorities have poor coordinating control in the provision of a sustainable transportation system since there is a lack of reviewing by authorities. Lack of review and monitoring is a key issue for the practical application of TIA due to the lack of accountability of the TIA report to the accuracy of the report. Thus, provision of timely and quality report will help to reduce administration and rework. The implementation of a comprehensive transport system from the planning stage is vital because when the problem aggregated in future, the developers are not around and not liable to the proposed infrastructure. Besides, compared to developed countries, the guidelines are more detailed with standardised forms and checklist of elements to be included in the report, some with template to present the data. Design years for some countries depends on the scale of the development categorised into high and medium impact development [12]-[17].

4. Conclusions
TIA is important to ensure the safety of the end users on road with proper planning in the initial stage of design. The proper conduct of TIA will prevent rework in later stage. This study found that regardless of education level, working experience and age, the obvious different between the level of knowledge of the road authority, state PWD (95%) and the local authority (51%). The lack of knowledge in the local authority hinders the intention to have the local authority to act as the approving authority in handling TIA to control traffic impacts in the local development. This study also indicated for the government to give the local authority the responsibility to carry out TIA independently is not effective. In return, causes delay in the TIA report submission. Delay are due to the problems by the consultant or the developer, lack of trained staffs to evaluate the reports, postpone of regular meeting and lack of information in the guidelines for TIA.

This resolved to the need to impose accreditation for approving authority, only qualified approving authority with sufficient qualifications in terms of knowledge and experience. This including having them to participate in intensive training to develop adequate knowledge in TIA Courses organised by
any road provider such as Public Work Department conducted by the Road Engineering Association of Malaysia or Institution of Engineers to ensure the quality and relevant of the training. This allow the authorities to accumulate sufficient experience in TIA to be in track with the trend of TIA and to be consistent in the TIA process. This study also recommended approval must be done in meeting that involved the TIA Assessors, more detailed information in the guidelines, checklist and monitoring programme to ensure the implementation of TIA is properly conduct and not merely for the planning approval.

5. Recommendations
While doing this research study, there are few improvements to achieve better result outcomes such as follows:

1. The questionnaire can be in multiple-choice test to reduce the error of getting the correct answer without knowing, the chance of being correct by guessing is reduced to 1/4 as compared to true and false test where the chance are 1/5 of being correct by guessing and not knowing the correct answer [18].
2. The scope of the respondents rather than Approving Authority, can be expanded to Developers and TIA Assessors as they also play vital roles in the practice of TIA. Their opinion and recommendations contribute greatly in the implementation of TIA.
3. Besides the study on the role of the parties involved in TIA, the TIA Guidelines and TIA case study or approved TIA report submission can be further research to provide the overall understanding on the lacking in the TIA practice.
4. The categories of the level of knowledge also should been identify by giving grading or grouping. In general, a lot of improvements can be done involving all parties that involve in this matter. JKR as one of the road providers play the biggest contribution to make sure this TIA guidelines been fulfilled.

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