Determination of Road Worthiness of In-use Public Utility Jeepneys (PUJs) in UP Diliman

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Abstract: Since public utility jeepneys (PUJ’s) are one of the major and popular modes of public transportation in the Philippines, it should be ensured that the jeepneys are roadworthy enough in terms of safety and convenience for both the driver, passengers and other motorists. This study aims to test the roadworthiness of the PUJ’s, in terms of technical and operational features and its contribution to the air pollution, and highlight the categories which are more likely to fail. This is done through an initial inspection of the PUJ’s in the University of the Philippines Diliman (UPD) by the UP Diliman Police (UPDP) and the proponents of this study, in accordance with the Land Transportation Office-Motor Vehicle Inspection Station (LTO-MVIS) requirements, in which a total of 83 jeepneys, 25% of the total UP PUJ population, are inspected. By the guidelines of the LTO MVIS, a failure even in one category signifies a failure of the overall roadworthiness of a PUJ. Also, additional safety and convenience features, proposed by the study are also checked. And because there are still no local standards for PUJ’s, the study will serve as an aid for future development of standards in which the local manufacturers can adhere with.

1. INTRODUCTION
1.1 Background

Jeepneys have evolved to become the more popular form of public transportation in the Philippines. Proof of this is the many variations in the design of the jeepneys’ body, some of which can be considered as if indigenous or characteristic of the city where the variant is found. A common trait, however, is in the engine used by these vehicles as most utilize surplus or second-hand engines sourced from Japan.

A total of about 216,988 jeepneys operate in the Philippines. Metro Manila has the highest concentration of PUJs with a total of 48,366 units, most of which traverse short to medium distance routes. (Ref. 1)

Though the appearance differs a lot from the military jeepneys, its predecessor, the jeepneys still have not yet changed, technically. The same technology that was applied decades ago is still the groundwork of its mobility. More improvements have been made on the designs and decorations of the vehicle than its operational features. Moving horse figurines, flags, colorful lights, amusing horns, paintings, stickers, are among the many kinds of creative improvisation on the jeepneys, but still none of these attribute to its overall effectiveness and efficiency.

To further improve the jeepney vehicles plying the roadways, there is a need for inspection and evaluation of its safety and operational aspects. In this intent, roadworthiness test of such vehicles should be done to highlight the parameters in which failure will most likely to occur.

1.2 Objectives of the Study

The primary objectives of the study are to determine the roadworthiness of the PUJs operating in UP Diliman in accordance with the LTO-MVIS standards through ocular inspection and smoke emission tester and find out the parameters in which the vehicle are most likely to fail.

Secondary objective includes the evaluation of the PUJs based on the additional checklist on safety, convenience and other technical aspects.

1.3 Significance of the Study

Since there is still no standards imposed on PUJs by the LTO and manufacture of these is based only on the assemblers’ standards, this study will serve as a guide for the development of such standards. It can also be used by present and future manufacturers of jeepneys to further improve on its safety and operational features for the commuters.
1.4 Scope and Limitations

The vehicles inspected were only PUJs operating in UP Diliman. Since the MVIS Main Office in East Avenue, Quezon City was undergoing rehabilitation during the time of the study, inspection was conducted by the UP Diliman Police. Because of the lack of facilities, certain parameters of the roadworthiness test were not checked such as sideslip test, brake test, speedometer test, headlight test, steering system and pit inspection.

Moreover, the additional checklist on safety and convenience which is not included on the LTO MVIR was proposed by the authors through standard body dimensioning, sheer judgment and adviser’s recommendation.

2. METHODS OF INSPECTION OF LTO AND UP DILIMAN

2.1 Standards and Methods of Inspection (Ref. 2)

Inspection of motor vehicles prior to registration shall be mandatory to ensure that the use thereof will not pose undue harm to the general public. In the case of jeepneys, this is more than a must because it is the most popular means of transportation in the Philippines.

2.1.1 Visual Confirmation Test of the Lighting Reflectors, Rear-View Mirrors, Windshield Wipers and Tires

2.1.2 Exhaust Emissions

2.1.3 Headlights

2.1.4 Buffer System

2.1.5 Fuel System

2.1.6 Maximum Allowable Passenger Capacity & Gross Vehicle Weight for Jeepneys (Table 1)

<table>
<thead>
<tr>
<th>Standard:</th>
<th>Capacity</th>
<th>GVW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17 passengers</td>
<td>2700 kg</td>
</tr>
<tr>
<td>Maximum:</td>
<td>21 passengers</td>
<td>3000 kg</td>
</tr>
</tbody>
</table>

2.1.7 Joint LTFRB-LTO Memorandum on PUV Classification (Table 2)

<table>
<thead>
<tr>
<th>GROSS WEIGHT</th>
<th>PASS. CAPACITY</th>
<th>BODY/DESIGN/CONFIG. CLASS/DENO</th>
</tr>
</thead>
<tbody>
<tr>
<td>4500 kgs &amp; below</td>
<td>17-21</td>
<td>Regardless</td>
</tr>
<tr>
<td>4500 kgs &amp; below</td>
<td>22-45</td>
<td>Regardless</td>
</tr>
<tr>
<td>4501 kgs &amp; above</td>
<td>22-45</td>
<td>Regardless</td>
</tr>
<tr>
<td>4501 kgs &amp; above</td>
<td>46 &amp; above</td>
<td>Closed Body with Doors</td>
</tr>
</tbody>
</table>

Determination on the seating capacity should be based on the actual measurements, in accordance with the implementing guidelines of RA No. 4136, particularly on the following, to wit:

- a. Seat space for passenger – 35 cm
- b. Back of seat to knee proportion of passenger (horizontal distance) – 60 cm

Height ceiling for regular bus – 1.8 m

Failure in even one of these parameters shall mean that the vehicle is not road worthy and fit for operation. Every parameter is important; even a broken wiper only is a failure. The vehicle cannot be registered until it complies with the tests conducted by the MVIS.

2.3 UPDP INSPECTION CHECKLIST

Annually, the UPDP conducts its own inspection on the UP PUJs in accordance with the LTO-MVIS requirements. This is being done to ensure safety of the commuters and the environment of UPD. Upon complying with the registration and inspection processes, permits were issued to the drivers and operators which will last for a year. The checklist used will be the basis of the authors on its roadworthiness test.

3. ADDITIONAL INSPECTION PARAMETERS

Additional parameters focused on safety, convenience and other operational features not included in the MVIR nor in the police inspection checklist were also checked based from adviser’s and authors’ recommendations:

3.1 Safety

a. Overhang – should not exceed 50% of the wheelbase length.

b. Bumper length – should not exceed 0.45 m. Bull bars in addition to bumpers should not protrude too much.

c. Passenger Capacity – should not exceed 21 persons including the driver.

d. Flooring – should not be rusty and slippery.

e. Ceiling – should be padded for safety.

f. Splash Pads – should be safe and equipped at all wheels.

g. Seatbelts – must be available and in good working condition for safety purposes in case of a collision.

h. Room Lamps – should not be protruding from the ceiling and should also have a cover to prevent electrocution

i. Interior Lamps – should be enough to illuminate the interior and should not be glaring. It should also have a cover for safety.

j. Unnecessary Lamps - should not be too excessive in number.
k. Exposed Wirings – should never be exposed, for safety.

3.2 Convenience

a. Step boards – must be equipped at all entry points. It must be safe and low enough to step onto. Step board height from the ground should not exceed 0.5 m, step board width should have a minimum of 0.25 m and height from step board to flooring should not exceed 0.25 m.

b. Headroom - at least 0.9 m should be provided.

c. Grab Handle at Entrances – must be equipped at all entry points. It should be safe and clean to hold on to.

d. Seat Pad – must be cushioned and safe, without protrusions, and with proper seat cover.

e. Back Rest – must be cushioned and safe, without protrusions, and with proper seat cover.

f. Room Ventilation – the interior should be well-ventilated and not suffocating.

g. Railings – should not be defective, dirty or rusty.

h. Rain Protector – should be equipped for all openings and should be easily lowered and raised.

i. Trash Cans – should be available and be placed conspicuously

3.3 Other Parameters

a. Body Code Specifications – must comply with the UP specifications.

   - Roof
   - Body Color
   - LTRFB Detail
   - Route
   - Sign Boards
   - Passenger Hotline Notice

b. Body Parts Materials – the exterior should be mostly made from galvanized and not stainless steel, especially at the rear to prevent glare to other motorists.

4. METHODOLOGY

4.1 North MVIS Site Visit

Preliminary stages of the study included site visit to the North MVIS facility located at the LTO Main Office in East Avenue, Quezon City, wherein actual inspections of motor vehicles were carefully observed and noted. It was known that most of the equipments used on inspection were either damaged or worn out (e.g. brake, sideslip test, etc.) so only visual confirmations and smoke emissions were being checked.

4.2 Sample Size

From a total of 324 PUJs of various routes in the university, a sample size of 83 jeepsneys or approximately 25% of the total population was inspected in this study. (Tables 3 and 4)

<table>
<thead>
<tr>
<th>ROUTES</th>
<th>SAMPLE SIZE (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP-PANTRANCO</td>
<td>88</td>
</tr>
<tr>
<td>UP-KATIPUNAN</td>
<td>80</td>
</tr>
<tr>
<td>UP-PHILCOA</td>
<td>42</td>
</tr>
<tr>
<td>UP-TOKI</td>
<td>15</td>
</tr>
<tr>
<td>UP-IKOT</td>
<td>55</td>
</tr>
<tr>
<td>UP-SM NORTH EDSA</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: UPD OVCCA

<table>
<thead>
<tr>
<th>ROUTES</th>
<th>SAMPLE SIZE (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP-PANTRANCO</td>
<td>21</td>
</tr>
<tr>
<td>UP-KATIPUNAN</td>
<td>19</td>
</tr>
<tr>
<td>UP-PHILCOA</td>
<td>12</td>
</tr>
<tr>
<td>UP-TOKI</td>
<td>6</td>
</tr>
<tr>
<td>UP-IKOT</td>
<td>15</td>
</tr>
<tr>
<td>UP-SM NORTH EDSA</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: UPD OVCCA

4.3 Initial Inspection

A dry run of the inspection was conducted in May 9, 2007 at the CMO grounds with the help of LTO personnel and (National Center for Transportation Studies) NCTS staff to establish the flow of inspection process. One jeepney out of each six routes was chosen at random as representative. Average inspection duration of about 15 minutes per jeepney was recorded. The actual inspection was scheduled about one week following the dry run but it was delayed due to difficulties encountered like providing an extra set of the exhaust emission tester.

4.4 Actual Inspection

The inspection of the PUJs was conducted at the UP Police and Fire Station from August 6-15, 2007. Therein, PUJs have undergone visual confirmation and smoke emission tests. The opacimeter used was provided by the MMDA (Metropolitan Manila Development Authority). Inspection process was observed and documented. (see Fig.1)

Figure 1. Inspection of Jeepneys, 08-13-07 UPD Fire Station
After the inspection, photocopies of accomplished inspection forms were issued for the roadworthiness assessment of the PUJs.

4.5 Inspection for Additional Checklist

Inspection on additional parameters regarding safety, convenience and other operational features were conducted simultaneously with the UPD inspection. But due to time restraints, complete accomplishment was not achieved. Additional inspection at the respective terminals of the UP-PUJs was conducted.

4.6 Profile of UP Diliman Jeepneys

After the inspection, both the police and additional checklists have been accomplished for each of the sample PUJs and a profile of the UP-PUJ were generated. Critical body dimensions, safety, convenience and operational features were listed and tabulated for each of the UP-PUJ per route.

4.7. Assessment

LTO-MVIS specified that failure on one category, minor may it be, will signify total failure. To determine if the UP-PUJ is roadworthy and fit for operation, it should attain passing remarks on all categories. Percentage of roadworthy PUJs, with respect to the total sample size, was computed. Also, for every parameter in the checklist, percentage of failure was calculated to determine and highlight the parameter of most failure for the PUJs. The same analysis was also done regarding the additional checklist on safety and convenience.

5. RESULTS OF INSPECTION

5.1 Police Inspection Results

Based from the police inspection results, it showed a percentage failure of 10-35% at all categories. The categories that signified the most failure were maintenance of chassis and operation of backlights (see Figure 6) with a percentage failure of 35% for the sample size of 83. This result was expected due to the fact that the under chassis is seldom checked for maintenance and the operation of backlights is often neglected in the manufacture of jeepneys.

Also, what is strikingly unusual is that a percentage failure of 16.87%, 22.89% and 25.3% for the headlights, signal lights and stoplights respectively. These parameters are very critical because defective lights, especially at night time, may result to accidents. (see Figure 2 above)

5.2 Additional Inspection Results

From the inspection results, it showed that 12 out of the 83 samples (14%) failed the allowable overhang length. This parameter is very critical because of overturning tendencies. On the other hand, wheelbase length has no restrictions since standards are not yet fully imposed. Wheelbase lengths depend on the structural capacity of the chassis which is only visually inspected if the thickness is sufficient enough to carry the estimated load. This means that any wheelbase length may be allowed as long as the overhang length requirement is satisfied, which is why 12-seater jeepneys are very common today. Most jeepneys nowadays are resized to accommodate more passengers and to be able to achieve this, the chassis is broken in half, and a support chassis is placed in between and then welded altogether. This is very dangerous because tendencies of structural failure are very high. Also, the engine will have to accommodate such additional load which will increase the amount of smoke emitted.

Headroom also signified an immense amount of failure which totaled 43% of the total sample size. Also, majority of the jeepneys that does not satisfy this requirement does not have padded ceilings which are very dangerous in case of bumpy rides.

Excessive bumper lengths are also prevalent within the UP PUJ population which indicated a failure rate of 63% (among the highest rate of failure). Add-ons such as bull bars for additional style are dangerous and make the jeepneys more prone to accidents. Swerving and maneuvering in traffic are achieved through the driver’s judgment but because of these over-protruding bumpers, accidents will be more prone.

The implementation of seatbelt law was started several years ago, but up to now several PUJs have failed to comply. An astounding failure rate of 69% was recorded, most of which are fixed and defective and can cause choking. When traffic enforcers are around, drivers wear their seatbelts which are not adjustable and the essence of safety is negated.

5.3 Emission Test Results

For the smoke emissions, only the first testing were considered and used by the authors in calculating the respective percentage passing and failures of the jeepneys. 320 jeepneys were officially registered to operate in the UP Diliman campus for school year 2006-2007. 19 of those 320 were marked either NEWLY O/H, Reject or NO SET leaving 301 PUJs
as the total sample size. According to LTO regulations, the maximum limit or passing value of smoke emission test is 2.50. The overall number of PUJs that passed the emission test is 176 out of 301 which gives a 58.47% passing rate and a 41.53% failure rate. (see Fig.1) Observations show that UP-Katipunan is the route that has the most number of jeepneys that failed the test, with 44 out of 76 jeepneys (57.89% failure rate) exceeding the maximum allowed value of 2.50. (see Table 5)

### Table 5. Smoke Emission Results

<table>
<thead>
<tr>
<th></th>
<th>Number of Vehicles</th>
<th>Number Passed</th>
<th>Number Failed</th>
<th>Percentage Passing</th>
<th>Percentage Failing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pantranco</td>
<td>79</td>
<td>50</td>
<td>29</td>
<td>63.29%</td>
<td>36.71%</td>
</tr>
<tr>
<td>Katipunan</td>
<td>76</td>
<td>32</td>
<td>44</td>
<td>42.11%</td>
<td>57.89%</td>
</tr>
<tr>
<td>Filoosa</td>
<td>38</td>
<td>25</td>
<td>13</td>
<td>65.79%</td>
<td>34.21%</td>
</tr>
<tr>
<td>SM North</td>
<td>39</td>
<td>29</td>
<td>10</td>
<td>74.36%</td>
<td>25.64%</td>
</tr>
<tr>
<td>IKOT</td>
<td>34</td>
<td>32</td>
<td>22</td>
<td>59.26%</td>
<td>40.74%</td>
</tr>
<tr>
<td>TOKI</td>
<td>15</td>
<td>8</td>
<td>7</td>
<td>53.33%</td>
<td>46.67%</td>
</tr>
<tr>
<td>Total</td>
<td>301</td>
<td>176</td>
<td>125</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OVERALL PERCENTAGE PASSING = 58.47%**  
**OVERALL PERCENTAGE FAILING = 41.53%**

In the emission test results, 125 jeepneys of the 301 total population failed, approximately 42%. Most came from the UP-Katipunan route (58%) which may be caused by excessive overhangs and wheelbases.

### 7. RECOMMENDATIONS

Most parameters in the UPDP checklist are checked through visual inspection. This means that the possibility of a jeepney to pass or fail a certain criteria that undergoes ocular inspection depends upon the person’s own judgment. Through observations made by the authors upon the approach of the UPDP personnel on the inspection of PUJs, it is recommended that compliance on each and every category should be strictly implemented. This is due to the fact that failure in even one of these parameters can result in the damage to properties and worse, loss of human lives.

It is recommended that the exhaust emission tests be done not just annually but at least every 3 or 4 months. It is because the drivers tend to disregard maintenance of their vehicles and will only do so prior to inspection. High values of exhaust emissions can cause tuberculosis and other respiratory ailments especially in the UP Diliman campus where most students utilize jeepneys as their primary means of transportation.

Also, safety and convenience should be highly considered. Hence, the authors would like to recommend the addition of the checklist they proposed on the standard methods of inspection of the PUJs. This will surely assist on the assurance of safety and convenience and it will also aid on the future manufacture of jeepneys.

Overall, the jeepney should be effective for its purpose and that is to provide a safe and convenient transport of people. New designs should not focus on the style and its appearance but on its workability and efficiency.

### REFERENCES

1. NCTS, DOTC & JICA, Metro Manila Public Transport Study
2. [http://www.lto.gov.ph](http://www.lto.gov.ph), Department of Transportation and Communication Land Transportation Office Official Website