Public Transport Issues in Small/Medium Sized Cities of the Philippines and Initiatives on Public Transport Vehicle Technologies

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Public Transport Modes in Philippine Cities

- Bus
- Jeepney
- Filcab (small engine jeepney)
- UV Express (utility vehicle/van)
- Taxi (passenger car)
- Tricycle (three-wheeler)
## Bus

<table>
<thead>
<tr>
<th>Classification</th>
<th>Seating Capacity</th>
<th>Gross Vehicle Weight (kg)</th>
<th>Body Make</th>
<th>Routes</th>
<th>Ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Utility Bus</td>
<td>50</td>
<td>6,400 and above and/or 70 kg/pax</td>
<td>Bus with entry and exit doors, emergency exits, optional separate baggage compartment and tempered glass windows</td>
<td>Fixed route, regular, limited-stop or express</td>
<td>Ordinary or Air-conditioned</td>
</tr>
</tbody>
</table>

Source: Land Transportation Franchising and Regulatory Board, Philippines

Photo Source: DOTC (2009) MVTA Scoping Seminar
# Mini-Bus

<table>
<thead>
<tr>
<th>Classification</th>
<th>Seating Capacity (except driver and conductor)</th>
<th>Gross Vehicle Weight (kg)</th>
<th>Body Make</th>
<th>Routes</th>
<th>Ventilation</th>
<th>Operating Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Utility Mini-Bus</td>
<td>30-49</td>
<td>6,400 and above and/or 70 kg/pax</td>
<td>Bus with entry and exit doors, emergency exits, optional separate baggage compartment and tampered glass windows</td>
<td>Fixed route, regular, limited-stop or express</td>
<td>Ordinary or Air-conditioned</td>
<td></td>
</tr>
</tbody>
</table>
## Jeepney

<table>
<thead>
<tr>
<th>Classification</th>
<th>Seating Capacity (except driver and conductor)</th>
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<th>Ventilation</th>
<th>Operating Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Utility Jeepneys</td>
<td>12-32</td>
<td>2,500-4,500 and/or 70 kg/pax</td>
<td>Jitney type</td>
<td>Ordinary</td>
<td>a.) May be allowed to carry passenger or freight or both for provincial operations</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>b.) Operation is discouraged along major arterials in urban areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>c.) Ceiling distance, unless authorized otherwise: 35 kms.</td>
</tr>
</tbody>
</table>

Source: Land Transportation Franchising and Regulatory Board, Philippines
Jeepney (Low-Speed Vehicle e.g. electric jeepney)

- Low Speed Vehicles (LSV) – 4-wheeled motor vehicles (other than ATVs, trucks, buses, and those that are excluded from the term “motor vehicle” under Republic Act 4136), which use alternative fuels like electricity and whose maximum speed capability is not more than 40 kilometers per hour


Source: Land Transportation Office (2012) Existing Guidelines in the Registration of Low-Speed Vehicles (LSV), Light Electric Vehicles (LEV) and Three-Wheeled Vehicles, DOTC (Dept. of Transportation and Communications, Philippines) Administrative Order No. AHS-2008-014, Registration of Low Speed Vehicles (LSV)
The operation of LSV shall be restricted to a maximum speed of 40 kilometers per hour. They can be operated within the central business district or along municipal, city, or barangay roads only.

LSV shall be issued a pair orange-colored plates and stickers for private LSV. In case the LTFRB grants franchise to LSV, yellow plates and orange-colored stickers shall be issued.
## Filcab

<table>
<thead>
<tr>
<th>Classification</th>
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<th>Operating Conditions</th>
</tr>
</thead>
</table>
| Filcab Regular       | 7-11                                          | Below 2,270 and/or 70 kg/pax | Mini-Jitney/Multicab | Fixed route     |             | a.) May be allowed to carry passenger or freight or both  
b.) Should not compete with higher—occupancy public utility vehicles on majority of the route  
c.) 15-km. ceiling distance unless authorized otherwise                                        |

Source: Land Transportation Franchising and Regulatory Board, Philippines
# UV Express

<table>
<thead>
<tr>
<th>Classification</th>
<th>Seating Capacity (except driver and conductor)</th>
<th>Gross Vehicle Weight (kg)</th>
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<th>Routes</th>
<th>Ventilation</th>
<th>Operating Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV Express Service (VFH, GT, FC)</td>
<td></td>
<td></td>
<td><strong>Vehicle Type:</strong> Asian Utility Vehicle (AUV), Van, Coach</td>
<td>Fixed route, Terminal to terminal</td>
<td></td>
<td>Air-conditioned</td>
</tr>
</tbody>
</table>

Source: Land Transportation Franchising and Regulatory Board, Philippines
## Taxi

<table>
<thead>
<tr>
<th>Classification</th>
<th>Seating Capacity (except driver and conductor)</th>
<th>Gross Vehicle Weight (kg)</th>
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<th>Ventilation</th>
<th>Operating Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxi</td>
<td>4</td>
<td></td>
<td><strong>Vehicle Type:</strong> Four or five door automobiles</td>
<td>From one origin point to any point in the island</td>
<td><strong>Air-conditioned</strong></td>
<td>No more than four passengers may be carried</td>
</tr>
</tbody>
</table>

Source: Land Transportation Franchising and Regulatory Board, Philippines
Tricycle (Three-Wheeled Vehicle or TWV)

• the operation of TWV, like motorcycle with sidecar or locally known as “tricycles” shall be limited within or along barangay roads only. It can only pass the main thoroughfares, highways or national road for purposes of crossing only when the barangay road is divided by a highway, main thoroughfares, or the national road

• while the 4-wheeled public transport modes are regulated by the national government, three-wheeled vehicles used for public transport are regulated by the local governments

TWV TYPE 3 - three-wheeled vehicle, relatively similar to the size of a conventional motorcycle with sidecar, mounted with a small cabin for driver in the front and seating for three in relative comfort in the rear

Source: Land Transportation Office (2012) Existing Guidelines in the Registration of Low-Speed Vehicles (LSV), Light Electric Vehicles (LEV) and Three-Wheeled Vehicles
Tricycle (Three-Wheeled Vehicle)

TWV TYPE 2 - three-wheeled with an enclosed cabin with seats for the carriage of more than 3 passengers to a maximum six (6) passengers (excluding the driver) depending on the number of seats provision.

Source: Land Transportation Office (2012) Existing Guidelines in the Registration of Low-Speed Vehicles (LSV), Light Electric Vehicles (LEV) and Three-Wheeled Vehicles
Transportation and Traffic Issues in Philippine Cities
Transport Issues-Large Cities

- increased use of automobiles
- traffic congestion
- disorderly loading and unloading on streets
- inadequate/disorderly parking
- limited road capacity
- disorderly movement at intersections
- lack of/ineffective public transport terminals
- disorderly public transport system
- difficulty in right-of-way acquisition
- air pollution

Transport and Traffic Issues-Medium Cities

- disorderly loading and unloading on streets
- inadequate/disorderly parking
- difficulty in funding projects
- traffic congestion
- limited road capacity
- disorderly movement at intersections
- difficulty in right-of-way acquisition
- increased use of automobiles
- heavy trucks in urban center

Transport and Traffic Issues-Small Cities

- difficulty in funding projects
- limited road capacity
- poor road maintenance
- difficulty in right-of-way acquisition
- disorderly loading and unloading on streets
- inadequate/disorderly parking
- increased use of automobiles
- heavy trucks in urban center
- accidents

General Issues on Transport and Traffic in Philippine Cities

- disorderly loading and unloading on streets
- inadequate/disorderly parking
- limited road capacity
- increased use of automobiles
- traffic congestion
- disorderly movement at intersections
- difficulty in right-of-way acquisition
- lack of/ineffective public transport terminals
- disorderly public transport system

## Problems in Cities – Public Transport

<table>
<thead>
<tr>
<th>Cebu</th>
<th>Cagayan de Oro</th>
<th>San Fernando (La Union)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• too many jeepneys/vehicles on the road uncontrolled/unlimited issuance of franchise for the public utility vehicles and issues concerning travel lines</td>
<td>• presence of unauthorized/illegal terminals and stalled vehicles along restricted streets • out of line public transportation vehicles • duplicated lines or service routes of motorelas (motorcycles with cab)</td>
<td>• lack of loading and unloading stations for public utility vehicles</td>
</tr>
<tr>
<td>• rampant use of motorcycles for public transport (similar to motorcycle taxi)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: CAPACITY BUILDING AND SOCIAL MARKETING FOR ENVIRONMENTALLY SUSTAINABLE TRANSPORT (EST) 
*Implemented by UP-NCTS for the DENR supported by the GRP-UNDP CPAP 2007 ENR-CORE Program 2007-2009*
Transportation in Urban Areas in the Philippines

- 12% of the roads are city and municipal roads
- The growth rate of motor vehicles has been on the average of 3.34% annually
- Jeepney is the most popular mode of public transport and became a symbol of Philippine culture
- City buses, taxis, vans are also daily modes of transport in dealing with increasing travel demand

For Metro Manila cities:
- Trains are becoming popular modes of public transport
- MRT services about 500,000 passengers per day, exceeding its rated capacity of about 350,000 passengers daily
- Philippine National Railways serves Metro Manila and southern Luzon

Source: Department of Transportation and Communications, Philippines (DOTC) (2014) Urban Transportation Policy, 27 January 2014
Issues and Challenges-Urban Transport

- Gaps between mobility and adequate infrastructure:
  - traffic congestion
  - public transport management issues
  - environmental issues (air pollution and GHG emissions)
  - accidents

- Development of new urban areas around Metro Manila:
  - large inter-city traffic demand
  - traffic jams on arterial roads

- Lack of comprehensive inspection and maintenance system for road vehicles to address safety and environmental issues

- Lack of alternative Non-motorized Transit (NMT) system for short-distance trips

Source: Department of Transportation and Communications, Philippines (DOTC) (2014) Urban Transportation Policy, 27 January 2014
Issues and Challenges-Urban Transport

- Transport and energy issue - rising fuel costs (transport share is 36% of total energy consumed in 2009)
- High car ownership
- Congested rail services
  - increased risk in transport safety and low comfort for passengers
  - encourage the use of less efficient modes of transport such as taxis and private cars
- Huge investment requirements
- Planning done by individual agencies with no effective integration mechanism
- Even integration within a mode difficult with agencies having overlapping function
- No guidelines on metropolitan transport planning

Source: Department of Transportation and Communications, Philippines (DOTC) (2014) Urban Transportation Policy, 27 January 2014
Urban Transport Programs

- adopt a comprehensive long-term National Transport Policy
- promote public transportation system that will serve high traffic demand, mitigate congestion and encourage modal shift from private to public transport
  (e.g. development of new rail lines, extension /improvement of existing rail lines, subway system, mass transportation system that will connect cities in Metro Manila, BRT)
  - public transport route network rationalization
  - Improvement of quality of motor vehicles and discipline on the roads
  - Construction of terminals that will connect provincial buses with other modes of transport in the cities making transportation in Metro Manila more efficient

Source: Department of Transportation and Communications, Philippines (DOTC) (2014) Urban Transportation Policy, 27 January 2014
Urban Transport Programs

• Development of environmentally sustainable transport and green transportation system
  - promotion of low carbon and alternative fuels
  - non-motorized transport

  o Pedestrian safety and convenience
    - walkable pathways in urban areas

  o Information technology enabled regulatory and enforcement system

Source: Department of Transportation and Communications, Philippines (DOTC) (2014) Urban Transportation Policy, 27 January 2014
Initiatives on Public Transport Vehicle Technologies for Small/Medium-Sized Cities in the Philippines

• Bus Rapid Transit
• Alternative Fuels
  - Compressed Natural Gas (buses)
  - Hybrid Buses
  - Auto-LPG (taxis and jeepneys)
• Electric Jeepneys
• Electric Tricycles
• Automated Guideway Transit (AGT)
• Jeepneys (Standards Development and Re-engineering)
Cebu Bus Rapid Transit (BRT)

- Establishment of the first BRT system in the Philippines.

- 23-km demonstration corridor in Cebu City, with 33 stations
- 176 buses that will run through dedicated and exclusive bus-ways from Bulacao to Talamban, with a link to Cebu’s South Road Property
- Bus projected to be available every 2 minutes at every station
- Forecasted traffic: 330,000 passengers daily (2015)

Source: DOTC (2011) Advancing EST in the Philippines: Recent Achievements and Challenges, 6th Regional EST Forum, Delhi, India, 4-6 Dec. 2011
### Proposed BRT Lines - Metro Manila

<table>
<thead>
<tr>
<th>BRTs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ortigas-R5</td>
</tr>
<tr>
<td>Line 2- Ortigas- Taytay</td>
</tr>
<tr>
<td>• C5</td>
</tr>
<tr>
<td>Commonwealth – FTI</td>
</tr>
<tr>
<td>• R7</td>
</tr>
<tr>
<td>Lerma – Espana – Q. Ave – Commonwealth – Regalado</td>
</tr>
</tbody>
</table>

Highly flexible to service to CBDs Makati, Fort Bonifacio, Ortigas

Source: Department of Transportation and Communications, Philippines (DOTC) (2014) Transport Development Plan Philippine Infrastructure Development Development Seminar, 15 February 2014
Natural Gas Vehicle Program for Public Transport (NGVPPT)

• government’s initiative to promote the utilization of compressed natural gas (CNG) for the transport sector
• goals: fuel supply diversification and sustainability
• utilization of indigenous natural gas sources from the Malampaya gas field, offshore in northwest Palawan

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Natural Gas Vehicle Program for Public Transport (NGVPPT)

• CNG price (Pilot Phase from 2008) sold at PhP18.38/kg
• 1 CNG Mother Refueling Station – Tabangao, Batangas
• 1 CNG Daughter Refueling Station – South Luzon Expressway (SLEX), Brgy. Sto. Tomas, Biñan, Laguna

• **61 CNG buses** in the country, with 37 units in actual operation (24 awaiting issuance of franchise to operate)

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Natural Gas Vehicle Program for Public Transport (NGVPPPT)

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Hybrid Buses – Makati City

• Green Frog Zero Emissions Transport (GFZET) established in 2010
• Green Frog Hybrid Bus

• Route: LRT 1 Buendia (Sen Gil. Puyat Ave) Station to C-5 Buting via Kalayaan Avenue in Makati City
• Start of operation: May 2013 (2 buses)
• Jan. 2014: (8 buses)
• Time: 5:30 AM to 10:00 PM
• Stops at 17 designated areas
• Headway: 15 minutes

Hybrid Buses – Makati City

• Green Frog buses are modeled after buses that ply highly urbanized cities like Singapore and New York, with lowered floors to ease entry and exit.

• Each bus has 6 security cameras, a tap card system for cashless payments, fire extinguishers and a GPS tracker.

• Flat fare: 20 pesos
• a prepaid tap card worth P200 is also available

Sources: Green Frog Zero Emissions Transport (https://GFZET)
Auto-LPG Program

- promotes the use of LPG for vehicles as a clean alternative technology at the same time diversifying the fuel utilization mix of the country

- the Auto-LPG initiative is a private sector- and market-driven system with the proponents taking advantage of the lower cost of LPG fuel as compared with gasoline

- the DOE coordinates with government agencies and private sector to ensure that the use of the fuel is according to standards on fuel, refueling facility and vehicle conversion, and also for verification tests to ensure the economic and technical viability of the technology to public utility jeepneys (PUJs).

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Auto-LPG Program

- 13,211 converted taxis as of July 31, 2013
- 218 LPG refueling stations as of April 2013
- 31 accredited Auto-LPG conversion shops
- Promulgated 5 Philippine National Standards (PNS) for Auto-LPG

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Auto-LPG Program (Jeepneys)

- With regard to auto-LPG for Public Utility Jeepneys (PUJs), DOE forged a Memorandum of Understanding with several PUJ transport groups on the “Adopt an Eco-Jeepney Program” on March 18, 2011.

- October 2011-the University of the Philippines-Vehicle Research & Testing Laboratory (UP-VRTL) conducted laboratory performance test using chassis dynamometer on two (2) auto-LPG repowered PUJs to obtain baseline fuel consumption data

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Auto-LPG Program

• an agreement was forged between the Philippine Department of Energy and the University of the Philippines on April 17, 2012, for the conduct of on-road performance tests of alternative fuel-vehicle jeepneys

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Performance Tests of Alternative Fuel Jeepneys

- 2 batches of on-road performance tests have been conducted on auto LPG-fed- and electric-powered jeepney units with a diesel-fed jeep as baseline vehicle in September 2012-May 2013.

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Performance Tests of Alternative Fuel Jeepneys

another agreement between Philippine Department of Energy and the University of the Philippines on December 27, 2013 for the continued conduct of laboratory test, and on-road performance test for alternative fuel-vehicles (jeepneys) simulating a rural driving to determine the AFV efficiency in a long distance routes with few stopping points.

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Electric Jeepneys

- E-jEEPNEy launched in Makati City in July 2007
- EjPeepney Transport Corp was awarded the first LTFRB franchise
  - 1st Battery Swapping Station
  - Technology Incubator
  - Fixed salaries to Drivers with full company benefits


Electric Jeepneys

- Global Electric Transportation Co. Ltd. (GET) plans to roll out the fleet of 50 fully electric city shuttles dubbed as “COMET” or City Optimized Managed Electric Transport by March 2014
- proposed route: SM North EDSA mall to SM Megamall via C-5 road
- 20-seater shuttle utilizes lithium ion phosphate battery.

Source: Global Electric Transportation Co. Ltd. (GET) (https://www.facebook.com/GETPhilippines)
Electric Tricycles

“The E-Trike Project”
Asian Development Bank (ADB) and the Philippine Department of Energy

**Project Overview**

- Deploy 100,000 E-Trikes powered by Lithium-ion batteries to replace traditional gasoline-fed tricycles
- Reduce the transport sector’s annual petroleum consumption by 2.8% (equivalent to 89.2 million liters) per year
- Achieve 79% carbon dioxide(CO$_2$) footprint avoidance
- Project Cost: US$504 Million

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Electric Tricycles (E-Trikes Project)

**Project Overview**

- Industry Development (Phase 1): 20,000 units
- Scale-up (Phase 2): 80,000 units

- Establishment and development:
  - Charging stations
  - Motor and parts supply chain
  - Battery leasing/recycling/disposal

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Electric Tricycles (E-Trikes Project)

- 3-wheeled vehicle
- 5 passengers (*excluding driver*)
- 3-kw electric motor @ 60kph
- 3-kwh Lithium-ion battery
- on-board charger
- battery management system (*BMS*)
- able to negotiate 16-degree slope terrain

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Electric Tricycles (E-Trikes Project)

Selection Criteria for E-Trike Drivers
1. Must be a bona fide member of a TODA (Tricycle Operators and Drivers Association) that pays his/her daily/monthly dues religiously
2. Registered voter of the host local government unit
3. Owner of 2-stroke engine tricycle; priority shall be given to tricycle 5 years old and above.
4. Holder of franchise registration and tricycle certificate of registration

Source: Alternative Fuels and Energy Technology Division, Energy Utilization Management Bureau (EUMB), Department of Energy
Transportation Roadmap 2011-2016 – Projects (Road-Based Public Transport)
Department of Science & Technology

ADVANCED TRANSPORT
a. AGT (Automated Guideway Transit)
b. CRT (Centrally-Powered Hybrid Electric Road Train)

INTELLIGENT TRANSPORT SYSTEM (ITS)
a. PUBFIX
b. Development On-Board Monitoring System for Public Utility Vehicle (PUV) for Traffic and Fuel Efficiency Improvement

SUSTAINABLE MASS TRANSPORT SYSTEM

JEEPNEYS
Development of Standards for Customized Local Road Vehicles
Development of Lightweight 22-seater Public Utility Jeepneys (PUJs) for city drive use

Source: Metals Industry Research & Development Center (MIRDC), Philippine Council for Industry, Energy and Emerging Technologies Research & Development (PCIEERD), Department of Science and Technology (DOST)
As part of the DOST Transport Road Map (2011-2016), a 465-meter automated guideway transit system (AGT) test track was constructed in 2012 at the University of the Philippines Diliman Campus in Quezon City.
Design & Development of an AGT System Depot & Passenger Stations

➢ To simulate actual operations by designing and developing an AGT System depot and passenger stations with safety features, communication and automatic fare collection system in UP Diliman, Quezon City.
➢ Started in December 2013

Source: Metals Industry Research & Development Center (MIRDC), Department of Science and Technology (DOST) Support Program for the Productivity and Competitiveness of the Metals & Engineering Industries
**Test & Evaluation of 120-Passenger per Coach Capacity AGT System – (Phase 2)**

- **Rationale:**
  To validate the improvements made, identify the parts that need modification, optimize operation parameters, standardize technical specifications and to evaluate how the system as a whole will respond to certain conditions.

- **Objective:**
  Specific: To test and evaluate the performance of the 120-Passenger Capacity per Coach AGT System in terms of safety, energy and technical viability.

On-going construction of AGT Test Track in Bicutan, Taguig (372 m.)

Source: Metals Industry Research & Development Center (MIRDC), Philippine Council for Industry, Energy and Emerging Technologies Research & Development (PCIEERD), Department of Science and Technology (DOST)
Jeepneys-Standards Development

Development of Standards for Customized Local Road Vehicles

- dimensions, selected systems, components and installation of light-signalling devices of customized local road vehicles are assessed and a significant share of the vehicle models being produced are not compliant with national vehicle regulations as well as other standards

- assembly lines (body assembly, chassis assembly) have also been observed

Source: Philippine Council for Industry, Energy and Emerging Technologies Research & Development (PCIEERD), Department of Science and Technology (DOST)
Development of Standards for Customized Local Road Vehicles

- **vehicle dimensions are recommended** for the development of road vehicle standards
- recommendations to revise the process flow as well as on the chassis fabrication are proposed

Source: Philippine Council for Industry, Energy and Emerging Technologies Research & Development (PCIEERD), Department of Science and Technology (DOST)
Development of Lightweight 22-seater Public Utility Jeepneys (PUJs)

The project aims to develop lightweight body architecture (10-30% weight reduction) of a conventional 22-seater PUJ using FEA with material substitution application.

To assess the current design and body architecture of a 22-seater PUJ.

To re-design the current vehicle body architecture of a 22-seater PUJ using process decision tool, CAD model and FEA technique.

Source: Metals Industry Research & Development Center (MIRDC)/Philippine Council for Industry, Energy and Emerging Technologies Research & Development (PCIEERD), Department of Science and Technology (DOST)
Research Interests

• Environmental Impacts of Public Transportation Systems

• Development of Standards for Local/Indigenous Public Transport Vehicles