Current Situation of Transport Data System in Thailand

Discussion Meeting with International Export on
“Essential Transport Indicators and Their Practical Applications”
23 June 2014
VIE Hotel Bangkok
Outline:

• Progress on Design of an MRV System for Transport Sector in Thailand

• Current Situation of Transport Data System in Thailand
Main Objective:

to design the support system for developing the national system for Measurement, Reporting, and Verification (MRV) in Thailand’s transport sector
Outputs:

• **Data** required for estimating the potential mitigation effects of a policy (or a set of policies) on GHG (Greenhouse Gases).

• **Model** for estimating transport activities

• **Methodology** for estimating the potential mitigation effects of a policy (or a set of policies) on GHG (Greenhouse Gases). The addition work in this component also includes the **MAC** analysis for the selected policies.
Non-urban rail ways improvements (Nation Level)

- **Non-urban rail ways improvements**: Existing railway is subject to be improved; doubling tracks, provision of train units, train interior and service improvement. Currently only 200 km out of 4000 km of railway line have double track. The train engines are lacking and result in irregular operations.
**Fuel efficiency policy (Nation Level)**

- *Fuel economy standard of all new vehicles:* A standard setting for fuel economy of motorcycle has enforced in 2014. Standards for other type of vehicles are going to be developed.

- **Car labelling:** In 2006, Energy Policy and Planning Office studied the fuel efficient label. Currently, Excise Department has studied the car labelling indicating the fuel efficiency and/or CO$_2$ emission.
Strategies/ Policies

Fuel subsidy reduction (Nation Level)

- The government fixed the LPG’s price for domestic use at 18.13 THB, diesel at 29.99 THB. Within 2013, the price of LPG for transport sector will gradually increase to reflect the cost of production.
Strategies/ Policies

Public Transport Management (City Level)

• **Bus Route Optimization:** Bus routes are developed and optimized by BTMA. One 16-km BRT line in Bangkok also has priority at signal junctions.

• **Integrated Ticketing:** A common electronic ticket is planned for major public transport in Bangkok. A single ticket can be used on most public transport in Bangkok.

• **Incentives for Public Transport Investments:** In Thailand, bus, van and boat is owned and operated by private/public sector.
• Urban rail transit network is planned in Bangkok. Twelve lines of PT have the total length of 467 km. Moreover, BMA studies some rail transit, mainly monorail/light rail and extension of the existing rail system. The first BRT line has been operating since 2012. The other four lines in the BMA Action Plan on Global Warming Mitigation 2007-2012 are Mor Chit line, Don Muang line, Minburi line, and Bangan line.
Non-Motorised Transport (NMT) (Project Level)

- **Cycling infrastructure:** The Government Cabinet acknowledged the resolution on Systems and Structures for Promotion of Walking and Cycling in Daily Life on November 19, 2013, and assigned relevant agencies to implement it.

- **Walking infrastructure:** Sidewalk is basic provision on most streets in cities. Walking paths are also provided as a basic access way in many areas.
Strategies/ Policies

Nation
- Non-urban rail ways improvements
- Fuel efficiency policy
- Fuel subsidy reduction

City
- Public Transport Management
- Urban PT infrastructure
Framework for CO$_2$ Emission Estimations

Measurement and Accounting

- Energy Consumption (MJ by Fuel Type)
- Fuel Carbon Content (CO2/MJ)

Top-Down Method

GHG Emissions from Transport

- A Activity / Transport Demand (VKT)
- S Structure of Modes (VKT by Mode)
- E Energy Intensity (MJ/km)
- F Fuel Carbon Content (CO2/MJ)

Strategies and Policies

- National Institutions and Stakeholders
  - Avoid Trips or Reduce the Distances Travelled
- Local Institutions and Stakeholders
  - Shift to Low Carbon modes
- Improve Vehicle Fuel Economy and Fuel Quality

Source: Low-Carbon Land Transport Policy Handbook
Energy Consumption
(MJ by Fuel Price)

Fuel Carbon Content
(CO2 /MJ)

Nation
Non-urban rail ways improvements
Fuel efficiency policy
Fuel subsidy reduction

Top Down
Non-urban rail ways improvements
Fuel efficiency policy
Fuel subsidy reduction

Number of Veh. Reg.
Fuel efficiency policy
Fuel subsidy reduction

Vehicle Kilometer Travel
PCU-KM / Ton-KM

NAM
Non-urban rail ways improvements

Questions

✔ Top Down VS Bottom UP (% Acceptable)
Nation Area Model

Bottom Up

Distribution of Vehicle Type/Model

Number of Veh. Reg.

- Fuel efficiency policy
- Fuel subsidy reduction

Vehicle Kilometer Travel

- PCU-KM / Ton-KM
- Number of Trips Traveling

Socio Economic

- GPP
- Census Data

Questions

✓ Limitation of Accesses to the Model for Estimating VKT
✓ Is it possible to directly distribute the vehicle types to the VKT?
✓ Fuel Subsidy Reduction (LPG) -> not a mode shift but changes in type of veh.

Non-urban rail ways improvements
Bangkok Area Model

City

- Public Transport Management
- Urban PT infrastructure

**eBUM**
- Traditional Travel Demand Model
- Infrastructure Sensitive

**ForFITS**
- Sketch Planning Model
- Policy Sensitive
- Developed by UNECE

= 

**การวิเคราะห์การปล่อยมลพิษและการใช้พลังงาน**
- Infrastructure + Policy Evaluation
Transfer Data between eBUM and ForFITS

ForFITS Modeling Processes

Transport Activities

Vehicle Stock

Energy Consumption

Emissions

GDP, population, structure of the transport system

Transport activity (pkm, tkm, vkm) and vehicle stock

Vehicle scrappage

New vehicle registrations by age and by powertrain

Energy use

CO₂ emissions

Fuel price

Vehicle price by powertrain

Energy consumption per km

Emission factors
Bangkok Area Model

ForFITS Modeling Structure

Passenger transport system characteristics
Base year: vehicles, travel and loads
Projections: structural information

Gross Domestic Product
Population
(base year and projections)

Freight transport system characteristics
Base year: vehicles, travel and loads
Projections: structural information

Passenger transport demand generation module
Freight transport demand generation module

Transport activity (pkm, tkm, vkm) and vehicle stock

New vehicle registrations by age and by powertrain

Energy use

Vehicle characteristics (vehicle price, technology cost, fuel consumption, performance) by powertrain

Fuel characteristics (cost and taxes)

Policy inputs

Fuel characteristics (emission factors)

CO₂ emissions

extended ASIF

ASIF

ASIF
## Inputs for Transport Activities in ForFITS

### DEMAND GENERATION PARAMETERS

<table>
<thead>
<tr>
<th>Passengers</th>
<th>Environmental culture multipliers</th>
<th>Vehicle travel cost multipliers</th>
<th>Elasticities as functions of GDP per capita</th>
<th>Freight</th>
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<tbody>
<tr>
<td><strong>Drivers as functions of GDP per capita</strong></td>
<td></td>
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<td><strong>Drivers as functions of GDP per capita</strong></td>
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<tr>
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<td></td>
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<td><strong>Elasticities</strong></td>
</tr>
<tr>
<td>Personal passenger vehicles (PPV) per capita</td>
<td>Personal passenger vehicles (PPV) per capita</td>
<td>Personal passenger LDVS</td>
<td>Annual personal vehicle travel to cost of driving</td>
<td>Share of light vehicles in total road freight</td>
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<tr>
<td>Pkm share on PPV in PPV + public transport</td>
<td>Personal passenger LDVS</td>
<td>Pkm share on PPV in PPV + public transport</td>
<td>Pkm on public transport vehicles to cost of driving</td>
<td><strong>Elasticities</strong></td>
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<td>Pkm share on air mode in total pkm</td>
<td>People per active bike</td>
<td>Pkm share on air mode in total pkm</td>
<td>Pkm on air vehicles to cost of driving</td>
<td>Tkm to the cost of tkm</td>
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<td>People per active bike</td>
<td>Personal vessels (boats) per capita</td>
<td>People per active bike</td>
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<td>Load factors to the cost of tkm</td>
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<tr>
<td>Personal vessels (boats) per capita</td>
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<td>Personal vessels (boats) per capita</td>
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### MODAL SHARES (EXOGENOUS PROJECTIONS)

<table>
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<th>Modal shares</th>
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<td>Modal shares between 2- and 3-wheelers</td>
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<td>Pkm shares in public transport modes</td>
</tr>
<tr>
<td>Vehicle shares in light road freight modes</td>
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</table>
Summary of Key Indicators

Non-urban rail ways improvements

Public Transport Management

Urban PT infrastructure

Fuel efficiency policy

Fuel subsidy reduction

Activity Indicators (Avoid-Shift)

1. PKM/capita
2. TKM/capita
3. VKM/capita (mode wise)
4. PKM mode share/Trips mode share, TKM mode share

Improve Indicators (Improve)

1. Annually increased in CO2 emissions
2. Annual Fuel consumption growth per year
3. Fuel consumption per VKT
Current Transport Model Data

• Data from Transport Model – NAM
• Data from Transport Model - eBUM
Current Transport Model Data
Current Transport Model Data
# Current Transport Model Data

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<thead>
<tr>
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<td>Population (NAM)</td>
<td>5.70</td>
<td>5.74</td>
<td>5.93</td>
<td>6.07</td>
<td>6.20</td>
<td>6.33</td>
<td>6.47</td>
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<tr>
<td>Population (eBUM)</td>
<td>10.40</td>
<td>11.54</td>
<td>12.29</td>
<td>12.99</td>
<td>13.88</td>
<td>14.94</td>
<td>16.10</td>
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<td>HH (Ml.)</td>
<td>3.61</td>
<td>3.85</td>
<td>4.18</td>
<td>4.48</td>
<td>4.83</td>
<td>5.28</td>
<td>5.75</td>
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<td>HH Size</td>
<td>3.00</td>
<td>2.99</td>
<td>2.94</td>
<td>2.89</td>
<td>2.86</td>
<td>2.83</td>
<td>2.80</td>
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<td>Ag Incomes</td>
<td>27,778</td>
<td>27,799</td>
<td>33,927</td>
<td>38,378</td>
<td>42,616</td>
<td>47,044</td>
<td>51,932</td>
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<td>Labours (Ml.)</td>
<td>5.86</td>
<td>6.27</td>
<td>6.71</td>
<td>7.2</td>
<td>7.81</td>
<td>8.36</td>
<td>8.94</td>
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## Bangkok Population

- **Population (NAM)**
- **Population (eBUM)**

![Graph showing population growth](image_url)
# Current Transport Model Data

<table>
<thead>
<tr>
<th>Year</th>
<th>eBUM Million</th>
<th>NAM Million</th>
<th>Veh. Reg (Nation) Million</th>
<th>Veh. Reg (Bangkok) Million</th>
<th>Portion Nation Million</th>
<th>Portion Bangkok Million</th>
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<tr>
<td>2010</td>
<td>223.51</td>
<td>331.84</td>
<td>28.48</td>
<td>6.18</td>
<td>11.650</td>
<td>36.182</td>
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<td>2011</td>
<td>230.48</td>
<td>335.50</td>
<td>30.19</td>
<td>6.57</td>
<td>11.111</td>
<td>35.064</td>
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<td>2012</td>
<td>253.32</td>
<td>362.38</td>
<td>32.68</td>
<td>7.24</td>
<td>11.158</td>
<td>35.412</td>
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<td>2013</td>
<td>281.70</td>
<td>404.93</td>
<td>34.62</td>
<td>7.92</td>
<td>11.685</td>
<td>35.572</td>
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<td>2014</td>
<td>313.28</td>
<td>472.09</td>
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<tr>
<td>2015</td>
<td>347.56</td>
<td>577.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2016</td>
<td>387.14</td>
<td>749.51</td>
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![VKT (Unit: Mil.)](image)
# Current Transport Model Data

## Person Trips in Bangkok

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Private</th>
<th>Share</th>
<th>Public</th>
<th>Share</th>
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<tr>
<td>2010</td>
<td>21,900</td>
<td>10,300</td>
<td>47.03%</td>
<td>11,600</td>
<td>52.97%</td>
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<tr>
<td>2011</td>
<td>22,347</td>
<td>10,600</td>
<td>47.43%</td>
<td>11,747</td>
<td>52.57%</td>
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<tr>
<td>2012</td>
<td>25,900</td>
<td>11,300</td>
<td>43.63%</td>
<td>14,600</td>
<td>56.37%</td>
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<tr>
<td>2013</td>
<td>30,100</td>
<td>12,300</td>
<td>40.86%</td>
<td>17,800</td>
<td>59.14%</td>
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<tr>
<td>2014</td>
<td>33,900</td>
<td>13,600</td>
<td>40.12%</td>
<td>20,300</td>
<td>59.88%</td>
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<tr>
<td>2015</td>
<td>39,200</td>
<td>14,900</td>
<td>38.01%</td>
<td>24,300</td>
<td>61.99%</td>
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<tr>
<td>2016</td>
<td>43,800</td>
<td>18,600</td>
<td>42.47%</td>
<td>25,200</td>
<td>57.53%</td>
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</tbody>
</table>
## Current Transport Model Data

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<thead>
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</thead>
<tbody>
<tr>
<td>BTS/MRT</td>
<td>636</td>
<td>683</td>
<td>2,798</td>
<td>5,611</td>
<td>7,065</td>
<td>10,309</td>
<td>10,888</td>
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<tr>
<td>Bus</td>
<td>10,407</td>
<td>10,451</td>
<td>10,902</td>
<td>11,167</td>
<td>11,975</td>
<td>12,520</td>
<td>12,857</td>
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<tr>
<td>Canal</td>
<td>280</td>
<td>298</td>
<td>300</td>
<td>318</td>
<td>383</td>
<td>487</td>
<td>526</td>
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<tr>
<td>Others</td>
<td>292</td>
<td>315</td>
<td>598</td>
<td>750</td>
<td>876</td>
<td>991</td>
<td>892</td>
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</tbody>
</table>

### Share of Public Transport (eBUM)

- **BTS/MRT**
- **Bus**
- **Canal**
- **Others**
## Current Transport Model Data

### Freight Data (NAM) - Thousand-Ton/Year

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Road</td>
<td>429,295</td>
<td>433,184</td>
<td>474,050</td>
<td>508,140</td>
<td>545,485</td>
<td>586,553</td>
<td>631,807</td>
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<tr>
<td>Rail</td>
<td>11,007</td>
<td>12,995</td>
<td>14,222</td>
<td>15,244</td>
<td>16,364</td>
<td>17,601</td>
<td>18,955</td>
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<tr>
<td>Water</td>
<td>70,149</td>
<td>71,690</td>
<td>78,454</td>
<td>84,122</td>
<td>90,270</td>
<td>97,073</td>
<td>104,557</td>
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<tr>
<td>Air</td>
<td>64</td>
<td>64</td>
<td>71</td>
<td>78</td>
<td>86</td>
<td>95</td>
<td>106</td>
</tr>
<tr>
<td>Total</td>
<td>510,515</td>
<td>517,933</td>
<td>566,797</td>
<td>607,584</td>
<td>652,205</td>
<td>701,322</td>
<td>755,425</td>
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</table>

### Freight Transport (Thousand Tons/Year)

![Graph showing freight transport over years](image-url)
# Current Transport Model Data

## Freight Data (NAM) - Mil.Veh.-Km/Year

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Road</td>
<td>183,541</td>
<td>185,345</td>
<td>202,390</td>
<td>217,180</td>
<td>233,622</td>
<td>251,866</td>
<td>272,362</td>
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<tr>
<td>Rail</td>
<td>3,146</td>
<td>3,335</td>
<td>3,650</td>
<td>3,911</td>
<td>4,201</td>
<td>4,519</td>
<td>4,867</td>
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<tr>
<td>Water</td>
<td>5,361</td>
<td>5,451</td>
<td>5,965</td>
<td>6,395</td>
<td>6,864</td>
<td>7,381</td>
<td>7,950</td>
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<tr>
<td>Air</td>
<td>50</td>
<td>51</td>
<td>55</td>
<td>59</td>
<td>64</td>
<td>68</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>192,088</td>
<td>194,181</td>
<td>212,060</td>
<td>227,545</td>
<td>244,751</td>
<td>263,824</td>
<td>285,253</td>
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</table>

## Average Trip Length for Freight (NAM) - Mil.Veh.-Km/Year

- **Road**: 150,000 in 2010, 200,000 in 2016
- **Rail**: 100,000 in 2010, 150,000 in 2016
- **Water**: 50,000 in 2010, 100,000 in 2016
- **Air**: 20,000 in 2010, 30,000 in 2016
- **Total**: 200,000 in 2010, 300,000 in 2016
## Current Transport Model Data

### Average Trip Length for Freight (Km)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Road</td>
<td>428</td>
<td>428</td>
<td>427</td>
<td>427</td>
<td>428</td>
<td>429</td>
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<td>Rail</td>
<td>286</td>
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<td>Air</td>
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<td>595.9</td>
<td>592.7</td>
<td>599.5</td>
<td>586.3</td>
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<td>Total</td>
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<td>374</td>
<td>374</td>
<td>374</td>
<td>375</td>
<td>376</td>
<td>377</td>
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### Average Trip Length for Freight (NAM) : Mil.Veh.-Km/Year

- **Road**: Yellow line
- **Rail**: Blue line
- **Water**: Gray line
- **Air**: Orange line
### Existing Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Department</th>
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<td>Number of Veh. Reg.</td>
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<td>Environmental Data.</td>
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<td>Traffic/Transport Data</td>
<td>Ministry of Transportation</td>
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<tr>
<td>- Transport network</td>
<td>OTP</td>
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<tr>
<td>- Freight Transport.</td>
<td>Depart. of Civil Aviation</td>
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<td>Railway Depart.</td>
<td>Annually Collected</td>
</tr>
<tr>
<td></td>
<td>Marine Depart.</td>
<td>Annually Collected</td>
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## Existing Data

### Traffic/Transport Data

- **Passenger Transport.**
  - BTS / MRT: Daily Collected
  - BMTA: Yearly Report
  - DOH (AADT): Yearly Report
  - DOH/ DOR/ OTP: By Project
  - Railway Depart.: Annually Collected
  - Marine Depart.: Annually Collected
  - Airport of Thailand PLC.: Annually Collected
**Existing Data**

- **Socio-Economic Data**
  - Number of Pop.
  - HH Incomes
  - HH Veh. Dist.

- **Census Data**
  - National Statistical Office

- **Depart. of Provincial Admin.**
  - Office of Transport and Traffic Policy and Planning

- **Admin. Data**
  - Collected by Proj.
Other Socio Economic Data

Note:
1- Population Census
2- Survey of Population and Housing
3- Household Socio-Economic Survey
4- Survey of Population Change

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Summary

• Needs for Modeling Tools
• Updated and Reliable Data
• Effective Indicators