

Socio-economic Situation and Approach toward the Low-carbon and Low-pollution Transportation System in ASEAN Member States

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This paper discusses mechanism of motorization focusing on income growth with urbanization and analyzes characteristics of ASEAN. Also this paper points out issues and effective measures of ASEAN for realizing the low-carbon and low-pollution transportation system, in order to deliberate Japan's support based on own experiences.

Key Words : ASEAN, urbanization, motorization, the low-carbon and low-pollution transportation system, ODA

1. BACKGROUND AND PURPOSE

Japan and ASEAN has established ASEAN-Japan Transport Partnership (AJTP) since 2002 to promote cooperation between Japan and ASEAN in the transportation sector. The number of vehicles in ASEAN is increasing with income growth and ASEAN is shifting to vehicle dependent transportation system. As a result, it is concerned that environmental burden in the transportation sector will increase and ASEAN will face serious environmental problems such as air pollution, climate change, noise and vibration. Among them, climate change is an important global issue, so international cooperation is needed to realize the low-carbon and low-pollution transportation system in ASEAN. Japan has supported ASEAN under AJTP to shift to the low-carbon and low-pollution transportation system based on Japan's experiences.

This paper focuses on income growth with urbanization as an engine of motorization in ASEAN and analyzes mechanism of the motorization to find out issues for the low-carbon

and low-pollution transportation system. Then, this paper points out effective measures of ASEAN for the low-carbon and low-pollution transportation system, as basic consideration of Japan's support. Note that the issues and effective measures of ASEAN for the low-carbon and low-pollution transportation system were discussed by Japanese experts and almost accepted to ASEAN Member States (AMS) under AJTP. Also note that Laos is excluded by the availability of information.

2. SOCIO-ECONOMIC SITUATION IN ASEAN MEMBER STATES

(1) Mechanism of Low-carbon and Low-pollution Transportation System in ASEAN Member States

It is said that in developing countries, as companies and factories are concentrated in urban areas, productivity will be improved through industrial accumulation. The improvement of

productivity in urban areas will cause income growth, which attracts rural population to seek for good jobs and urban population increases more (urbanization). AMS where increase of urban population is expected to enjoy income growth with progress of urbanization.

According to Hiroko YAMASHITA, Assistant Professor, Hitotsubashi University, when Gross National Income (GNI) per capita exceeds 3,000 \$, people can afford to purchase vehicles. We can expect that motorization will start in AMS as income increases with urbanization. But if motorization starts in AMS where road infrastructure is still insufficient, serious traffic congestion will take place, which leads to air pollution with vehicle emissions, climate change with increase of greenhouse effect gases (GHGs) emissions from vehicles, and noise and vibration with heavy traffic. Furthermore, public transportation system which emits lower air pollutants and GHGs emissions per traffic volume than vehicles is still insufficient in AMS, it is concerned that public transportation system cannot cover the traffic demand and will lower its service level such as punctuality and amenity, which leads to promotion of vehicle dependency. However urban areas are expanding in AMS, people have no choice but to use vehicles without urban design including development of public transportation

system. AMS may face degradation of life environment such as air pollution, climate change, noise and vibration in urban areas with motorization if the bottlenecks of insufficient road infrastructure and public transportation system are remain unresolved. In addition, according to Kiyoyuki MINATO, Japan Automobile Research Institute, points out that Japan suffered from serious air pollution caused by vehicle emissions in the early 1970's when the number of vehicles owned per thousand people exceeded 100.

AMS are necessary to implement following measures with Official Development Assistance (ODA) or referring to Comprehensive Asia Development Plan (CADP), in order to realize the low-carbon and low-pollution transportation system where environmental burden in the transportation sector is reduced while economic growth is achieved;

- Development of road infrastructure such as bypasses, ring roads and public transportation system to resolve the bottlenecks
- Reduction of air pollutants and GHGs from vehicles (individual measures)
- Smoothing road transportation with traffic demand management (TDM) and intelligent transportation system (ITS)

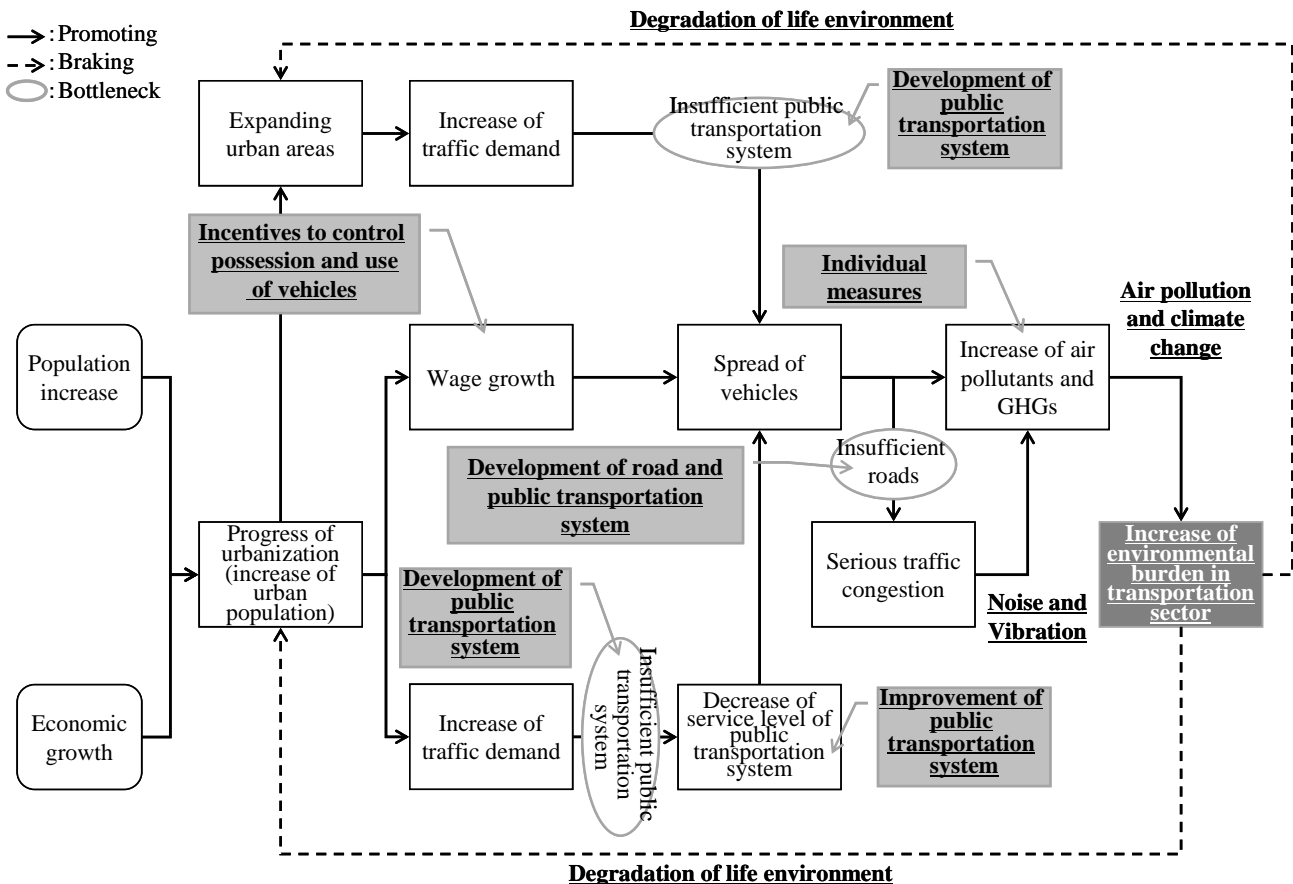


Fig.1 Mechanism of Low-carbon and Low-pollution Transportation System in AMS

Additionally, AMS need to review their taxation on vehicles and fuels in order to provide incentives to control possession and use of vehicles. Also, AMS are required to improve public transportation system in order to promote modal shift from vehicles.

(2) Characteristics of Low-carbon and Low-pollution Transportation System in ASEAN Member States and Japan's Support

To find the impact of income growth on motorization and carbon intensity of the transportation sector in AMS, we are going to analyze relationship among GNI per capita in 2008, the number of vehicles owned per thousand people in 2008 and the amount of CO2 emission in the transportation sector per GNI. The amount of CO2 emission in the transportation sector per GNI is the amount of CO2 emission in the transportation sector in 2007 divided by GNI in 2008 and regarded as environmental efficiency of the transportation

sector.

The motorized AMS where GNI per capita exceeds 3,000 \$ as bench mark of motorization and the number of vehicles owned per thousand people exceeds 100 as bench mark of vehicle related air pollution are Singapore, Brunei, Malaysia and Thailand. GNI of per capita of Singapore and Brunei are 33,640 \$ and 24,878 \$ which reach the standard of high income countries. Particularly in Singapore where urban transportation system is well developed, the number of vehicles owned per thousand people is only 150 and the amount of CO2 emission in the transportation sector per GNI is only 0.04 t-CO2/\$. The numbers are low and we can say that Singapore has made progress in the low-carbon transportation system based on well developed public transportation system. On the other hand, Brunei where public transportation system is almost undeveloped scores 262 on the number of vehicles owned per thousand people which is the second highest next to Malaysia in

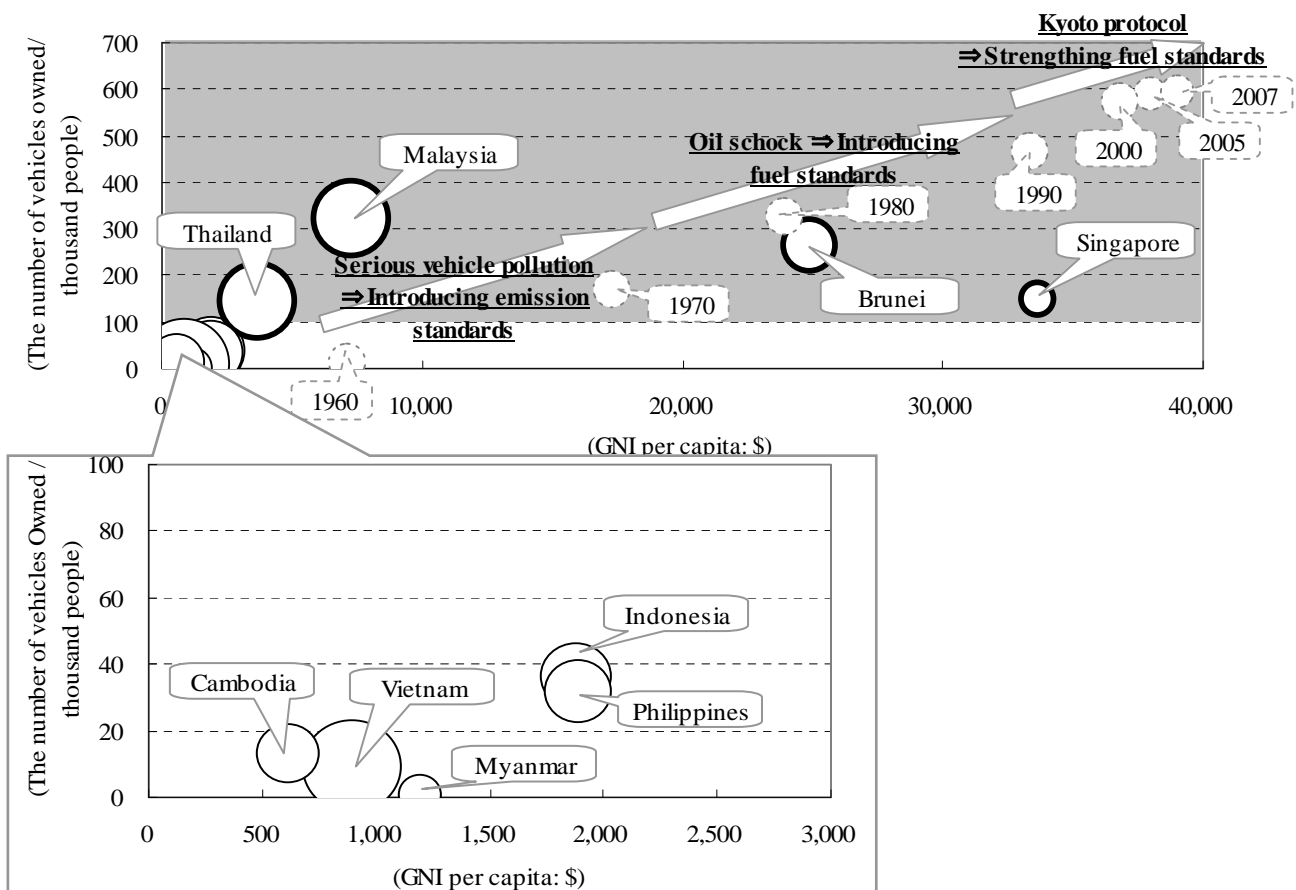


Fig.2 Relationship among income, motorization and carbon intensity of the transportation sector in AMS and Japan

Note 1 Excluding Laos.

Note 2 GNI per capita in 2008, the number of vehicles owned per thousand people in 2008.

Note 3 The size of circles shows the amount of CO2 emission in the transportation sector per GNI. The amount of CO2 emission in the transportation sector per GNI is the amount of CO2 emission in the transportation sector in 2007 divided by GNI in 2008. Dashed circles show Japan's motorization path.

Note 4 Screen shows the area where GNI per capita exceeds 3,000 \$ as bench mark of motorization and the number of vehicles owned per thousand people exceeds 100 as bench mark of vehicle related air pollution.

AMS. People in Brunei have to possess and use vehicles for transportation with high income and Brunei seems be on the Japan's motorization path in 1980's. As for Malaysia and Thailand, their GNI per capita are 7,259 \$ and 3,690 \$ which are lower than Singapore and Brunei, but the number of vehicles owned per thousand people are 320 and 146. Malaysia and Thailand are expanding their traffic demands with population and economic growth, but public transportation system cannot cover the demands. So, Malaysia and Thailand depend on mainly vehicle for. Meanwhile, Philippines, Indonesia, Myanmar, Vietnam and Cambodia where GNI per capita are under 3,000 \$ cannot afford to purchase vehicles and motorization has not started yet. The numbers of vehicles owned per thousand people in the non-motorized AMS are from 1 to 36 and the amounts of CO₂ emission in the transportation sector per GNI are from 0.07 to 0.17 (except Vietnam, 0.30) which are lower than Malaysia and Thailand. Among those non-motorized countries, the sizes of Indonesia, Philippines and Vietnam are large and the amounts of CO₂ emission in the transportation sector of the countries are 71.8 Mt-CO₂, 26.0 Mt-CO₂ and 23.4 Mt-CO₂. It is pointed out that even though non-motorized AMS, environmental burden of the transport sector in Indonesia, Philippines and Vietnam are large.

When looking at Japan's motorization path since 1960, the number of vehicles owned per thousand people has increased with income growth steadily. But in Japan, the amount of CO₂ emission in the transportation sector per GNI has been remained from 0.05 t-CO₂/\$ to 0.06 t-CO₂/\$ with efforts of public and private sector, such as well developed railway networks initiated by private companies, strict vehicle emission and gas mileage standards in order to respond to vehicle related air pollution, oil-shocks and climate change. Comparing AMS with Japan's motorization path, Singapore is advanced in realizing the low-carbon and low-pollution transport system and Brunei is similar to Japan in 1980's. And Malaysia and Thailand facing more rapid motorization than Japan are required to tackle to reduce environmental burden in the transport sector more aggressively than Japan. On the other hand, non-motorized AMS of which the numbers of vehicles owned per thousand people are the same levels as Japan in 1960's, need to learn lessons from Japan and tackle to reduce environmental burden in the transportation sector, anticipating of the coming motorization.

3. APPROACH TOWARD THE LOW-CARBON AND LOW-POLLUTION TRANSPORTATION SYSTEM IN ASEAN MEMBER STATES

(1) Approach of Motorized ASEAN Member States

Urbanization with population and economic growth has been proceeded in AMS, and Singapore, Brunei, Malaysia and Thailand are regarded as motorized AMS where GNI per capita exceeds 3,000 \$ and the number of vehicles owned per thousand people exceeds 100. Among motorized AMS, Malaysia and Thailand face more rapid motorization than Japan and development of the low-carbon and low-pollution transportation system has been in behind because the amount of CO₂ emission in the transportation sector per GNI of the countries are high. Aiming for realizing the low-carbon and low-pollution transportation system through reduction of environmental burden of vehicles, Malaysia and Thailand are required to introduce alternative fuels, low-pollution and fuel efficient vehicles, to develop road infrastructure for smoothing traffic with ODA or based on CADP, and to improve capacity and service level of public transportation system for promotion of modal shift from vehicles. Furthermore, CADP points out the importance of cross border logistics, and Malaysia and Thailand are key junctions in Malay Peninsula and Indochina. Therefore, Malaysia and Thailand also need to improve efficiency of vehicle dependent logistics system.

As for Brunei where public transportation system is almost undeveloped and motorization has been in progress as the same level of Japan in 1980's, has not established appropriate vehicle emission and gas mileage standards. Realizing the low-carbon and low-pollution transportation system, Brunei is required to introduce measurement of vehicle emissions, vehicle standards and inspection in order to develop system to reduce environmental burden of vehicles, to develop road infrastructure for smoothing traffic with ODA or based on CADP, and to develop public transportation system to promote modal shift from vehicles.

On the other hand, Singapore where urban transportation system is well developed has made progress in the low-carbon and low-pollution transportation system. For promoting the further low-carbon and low-pollution transportation system, Singapore is required to introduce advanced public transportation system such as hybrid train and to implement advanced individual measure such as promoting electric vehicles.

(2) Approach of Non-motorized ASEAM Member States

Philippines, Indonesia, Myanmar, Vietnam and Cambodia are regarded as non-motorized AMS where GNI per capita are under 3,000 \$ and the numbers of vehicles owned per thousand people are under 100. But in Indonesia Philippines and Vietnam, motorcycles are spread which are cheaper than vehicles and motorization has been started in big cities. Even though the numbers of vehicles owned per thousand people are low, the sizes of Indonesia, Philippines and Vietnam are large, so environmental burden of in the transportation sector also come to be large. Therefore, large sized non-motorized AMS, Indonesia, Philippines and Vietnam are required to introduce alternative fuels, low-pollution and fuel efficient vehicles in urban areas, to develop road infrastructure in urban areas with ODA or based on CADP, and to improve

capacity and service level of urban transportation system for promotion of modal shift from vehicles for realizing the low-carbon and low-pollution transportation system. Also, Vietnam is a key junction in Mekong Delta and needs to improve efficiency of logistics.

On the other hand, the amounts of CO2 emission in the transportation sector per GNI of Myanmar and Cambodia are low, and environmental burden in the transportation sector is not so large. But motorization in urban areas in Myanmar and Cambodia will start soon with income growth, so it is necessary to deliberate introduction of vehicle emissions measurement, vehicle standards and inspection in order to develop system to reduce environmental burden of vehicles and the development suitable road infrastructure and public transportation system, preparing for the coming motorization.

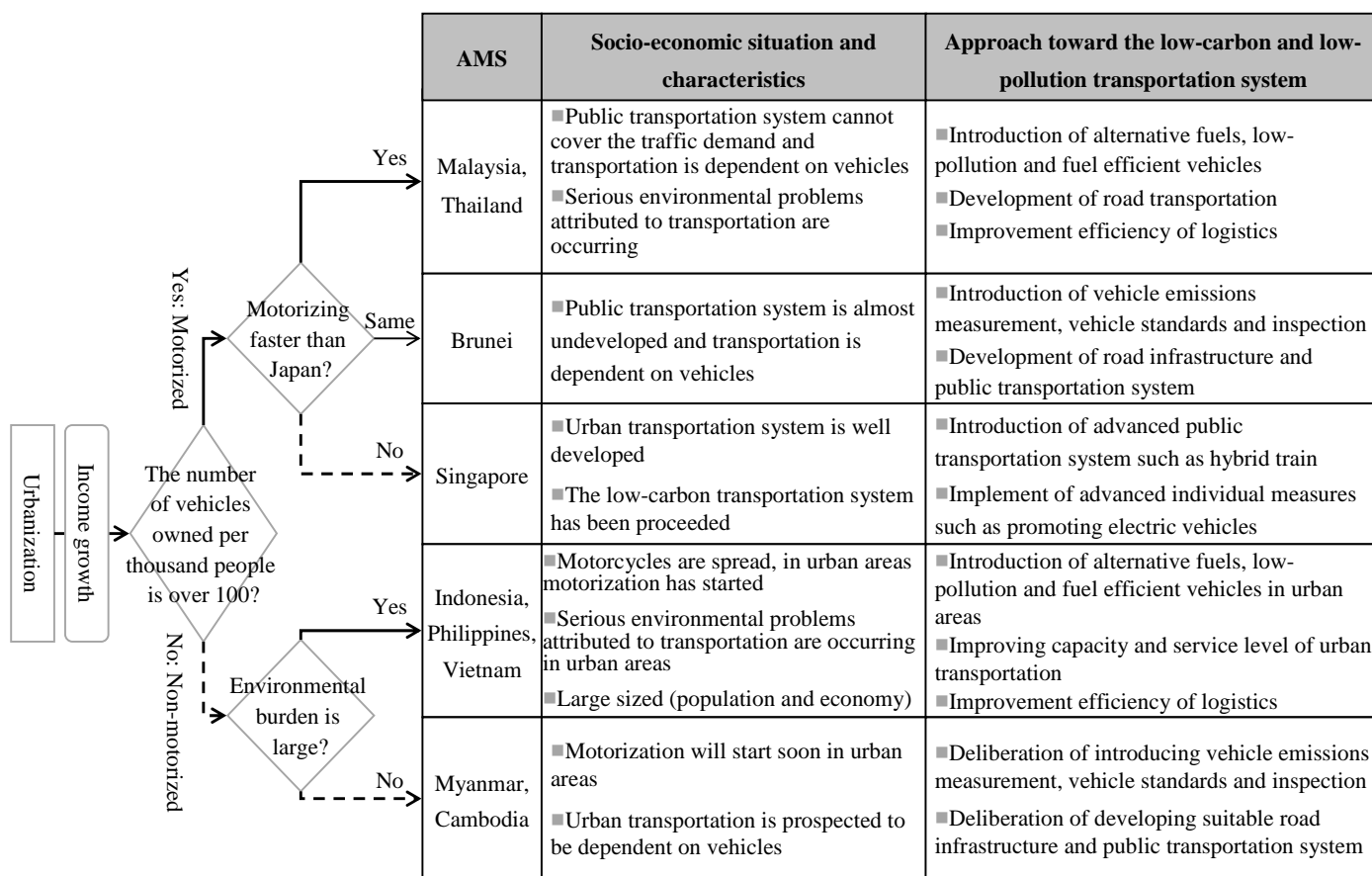


Fig.3 Socio-economic situation and characteristics and approach toward the low-carbon and low-pollution transportation system in ASEAN

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