Chapter 3

Features of the System

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2.2 Objectives of IDE/ERIA-GSM

Analysis using IDE/ERIA-GSM has two major objectives. The first objective is to know the dynamics of the location of population and industries in East Asia for the long term. Although there are many analyses to forecast the macroeconomic indices in East Asia at the national level, there has been no analysis using the models to forecast economic development in East Asia at the subnational level except for a scant amount of literature. In an era of regional economic integration, economic analysis at the national level is not enough to provide useful information for regional economic cooperation.

The second objective is to analyze the impacts of specific infrastructure projects on the regional economy at the subnational level. It is difficult to prioritize various infrastructure development projects without the proper, objective evaluation tools. IDE/ERIA-GSM was developed to provide an objective evaluation tool for policy recommendation in infrastructure development.

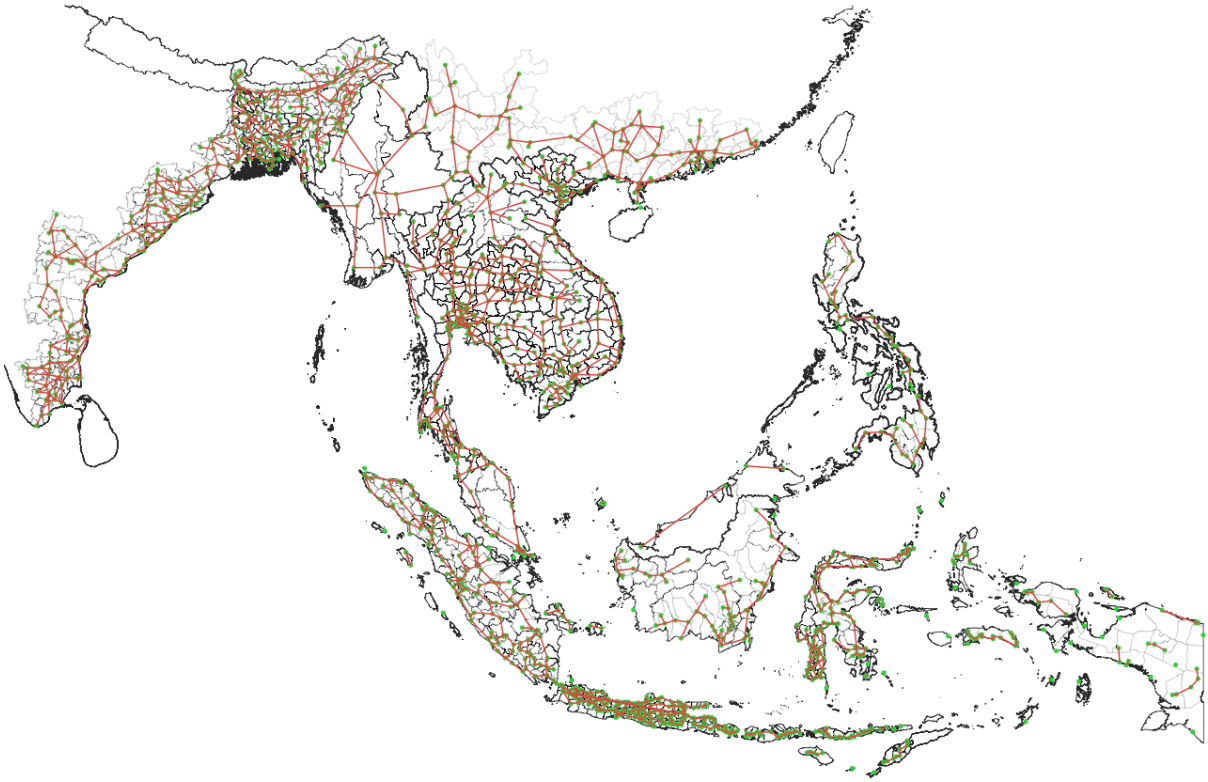
3. Features of the System

3.1. Basic feature of the system

IDE/ERIA-GSM covers the following 12 countries and regions in the analyses (Figure 1).

- Singapore
- Malaysia
- Thailand
- Myanmar
- Cambodia
- Lao PDR
- Indonesia
- Philippines
- Vietnam
- China (Yunnan, Guangxi, and Guangdong provinces)
- Bangladesh
- Western India

Figure 1: Regions and Routes (land only) included in IDE/ERIA-GSM



Each country/region is subdivided into states/provinces/divisions. Each state/province/division is represented by its capital city, and there are a total of 956 subnational regions. The following data are used in each subnational region:

- GDP by sector (primary, secondary[1], and tertiary industries)
- Employee[2] by sector (primary, secondary, and tertiary industries)
- Longitude and latitude
- Area of arable land[3]

In addition to these cities that have population and economic activities, 693 cities, ports, and airports, which are topologically important, are included in the model.

The number of route data amounts 2,694. Among them, 1,890 land routes between cities are included, based mainly on the "Asian Highway" database of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). The actual road distance between cities is used; if road distance is not available, slant distance is employed. Air and sea routes are compiled from the data set assembled by the team of the Logistics Institute - Asia Pacific (TLIAP), and 488 sea routes and 270 air routes are selectively included in the model at this moment.

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[1] The secondary sector is divided into five industries, namely, automotive, electrical and electronic (E&E) products, textile and garments, food processing, and other manufactured goods.

[2] GMS treats population and employee as the same thing in this version.

[3] If subnational data of arable rand is not available, national-level data is used. National area of arable land is distributed to each subnational geographical unit proportional to its land area.

3.2. Advantages of the system

IDE/ERIA-GSM has the following three advantages.

Realistic enough to model the real world

The first advantage of IDE/ERIA-GSM is that it incorporates a realistic topology of cities[4] and routes between them. In case of theoretical studies in spatial economics, "geography" is incorporated in the model as cities on the line or cities on the circle (the so-called "race-track economy" in Fujita, Krugman, and Venables, hereafter to be referred to as FKV 1999). On the other hand, the precedent empirical models used to incorporate geography as "mesh" or "grid" representation or a "straight line" representation, which simply connects cities as places of production and consumption to one another by straight lines. There is no topology, or geography in these models refers to the distances between cities.

IDE/ERIA-GSM differs from these models in that it incorporates geography as a "topology" of cities and routes. The topology representation of geography has three major advantages over the mesh representation. First, it makes it possible to incorporate the realistic choice of routes in logistics whereas the mesh representation does not necessarily incorporate routes explicitly. A problem of topology representation is in calculating the minimal distance between any two cities in consideration of every

[4] The word "city" is used in GSM in the administrative sense. However, GSM does not exclude the possibility of defining "city" in terms of a more realistic area according to actual economic activities.