Development of Regional Statistics through Cooperation with Central and Local Governments

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1. Spatial Units Used for Developing Regional Statistics

There are two approaches to develop regional statistics. One approach is to develop statistics for local administrative areas which falls under the jurisdiction of local governments. The other is the approach in which geographic referencing is used to collect and publish statistics. This approach, aimed at improving the availability and usefulness of small area statistics, has well been developed by U.S. Bureau of the Census's TIGER (Topologically Integrated Geographic Encoding and Referencing) system. Among two approaches, this paper focuses on the first approach.

Local governments in the Republic of Korea are of two types. On the one hand are the higher governments of special city and province, and on the other lower governments of district, ordinary city and county. The relationship among them is that special cities are composed of districts, and provinces are composed of ordinary cities and counties. There are now seven provincial-level special cities and nine provinces, and 69 districts, 75 ordinary cities and 86 counties in Korea. These are spatial units the Korea National Statistical Office (KNSO) has set a target for developing and publishing statistics.

As shown in the table 1, the situation of some other countries is also revealed to be similar with that of Korea. To say, it is common in most countries that there are two layers, upper (or higher local governments) and lower layers (or lower local governments), which are basically used for collecting and publishing regional statistics.

<Table 1> Spatial Administrative Units Commonly Used for Regional Statistics in Selected Countries

	Korea	Japan	U.K.	U.S.A.
Higher local governments	Provinces (16)	Prefectures (47)	Government Office Regions (12)	States (50)
Lower local governments	Districts/Counties/ Cities (230)	Cities/Townships/ Towns (3,229)	Local Authority Districts (about 440), Wards (8,800)	Counties (3,141)

2. Main Reasons of Increased Demands for Regional Statistics

Traditionally, the country has been ruled by a strong central government with no local autonomy in the

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true sense of the term. However, in 1995, Korea was able to amend the Local Government Act, introducing direct election of the chief executive officer and council members in those local governments. Consequently, since 1 July 1995, the local autonomy has been put into practice in the Republic of Korea.

This change has resulted in an increased demand for accurate and timely regional statistics. In the past before the introduction of the local autonomy, policies were implemented on the basis of national averages. However, policy-implementation without taking into consideration of the regional differences tends to fail.

Local governments came to realize that statistics are the key to informed decision making for the achievement of their objectives. Furthermore, statistics would enable both local and central government to establish benchmarks against which performance and progress could be measured. This would contribute the overall development for the whole country.

Specifically, the necessity of the regional statistics in the following areas have been raised by the local governments in Korea in a recent time: 1) statistics to show regional differences such as statistics on gross domestic product, occupation and industrial structure, unemployment rate, household income, average cost of a dwelling, crime rate, 2) statistics on strategic industries each local government has adopted to foster such as statistics on bio-industry, information and telecommunication industry, tourism, creative industry, logistics industry, and 3) statistics on the performance each local government has achieved such as statistics on the outcome of welfare policies implemented by each local government.

3. Current Status on Regional Statistics in Korea

Many of the data needed by local governments are already available from the data sources such as censuses, sample surveys or administrative data sets. For example, censuses conducted by KNSO are as follows: quinquennial censuses on Agriculture & Fishery, on Population & Housing, on Basic Characteristics of Establishments (annual), on Mining & Manufacturing, on Wholesale, Retail Trade & Services Sector. In addition to these censuses, administrative reports such as records from the Civil Registration System provide statistics on vital events and internal migration for smaller geographical areas.

Meanwhile, KNSO's sample surveys producing the data by the level of higher local governments (provinces) are as follows: annual Basic Agricultural Statistics Survey (for statistics on the revenue of farm households), monthly Labour Force Survey (for statistics on employment and unemployment), monthly Mining & Manufacturing Survey (for indices on industrial production, inventory and shipment), and Consumer's Price Survey (for consumer's price indices).

4. KNSO's Current Efforts Being Implemented

4.1 KNSO's Own Efforts to Develop Three Kinds of Regional Statistics

Firstly, realizing the increasing demand for statistics on employment and unemployment by lower local governments (cities/districts/counties) rather than provincial level, KNSO has decided to conduct a large-scale survey on an annual basis. The first survey is planned to be conducted during 20 October – 1 November 2008. A sample of 180,000 households in 8,797 EAs(enumeration areas) were selected from the result of the 2005 Population Census, through the method of the stratified systematic cluster sampling. A total number of 1,823 interviewers are to be recruited, being four EAs(80 households) assigned to each interviewer for the survey period.

The results on the economic status at the levels of city/district/county are planned to be released in March 2009. Meanwhile, for the second survey which will be conducted in 2009, the sample size will be increased to 200,000 households in 10,000 EAs. Another feature of this large-scale survey is that the sampled households are to remain in the sample for a period of five years.

As shown in the table 2, in some other countries like the U.S., Canada, Australia and the U.K., statistics on unemployment is already made available at the lower layers through either directly by the survey or the method of model-based estimation. However, the case of Korea is revealed to be solely dependent on the method of the direct survey, not utilizing the small area estimation technique. The responsibility for the production of such statistics in these countries is fallen into the hands of central statistical organizations not the hands of local governments.

<Table 2> Availability of Sub-national Unemployment Statistics in Selected Countries

Country	Periodi-city	Spatial units for which data are made available	Method of compilation and agency responsible
Korea	Annual	For cities/districts/counties	Labour Force Survey (200,000 households) by KNSO
U.S.A.	monthly	For about 7,200 areas, including all counties	Model-based estimates (Local Area Unemployment Statistics program) by Bureau of Labor Statistics
Canada	monthly	For provinces, 27 large cities, 73 economic regions	Labour Force Survey (54,000 households) by Statistics Canada
Australia	monthly	For 8 States, 77 Statistical Regions	Labour Force Survey (28,600 private dwellings, 1,900 non-private dwellings) by ABS
U.K.	quarterly	For 460 local authority districts	Model-based estimates using quarterly Labour Force Survey (55,000 households for every quarter), annual survey and claimants counts by ONS

Second statistics KNSO is enthusiastically emphasizing is the Gross Regional Domestic Product (GRDP). Thus, KNSO was successful to produce Gross Provincial Domestic Product from 1993. However, the compilation of GRDP at the level of cities/districts/counties has not been achieved up to now. KNSO in cooperation with the Ministry of Government Administration & Local Autonomy as well as the Provincial Governments is doing its efforts to compile GRDP at the level of cities/districts/counties.

Especially, the Ministry of Government Administration & Local Autonomy is very much eager to develop the statistics on GRDP at the level of cities/districts/counties. The main reason is that the Ministry came to realize that GRDP is an excellent performance indicator which can show clearly the economic output of each local government on an annual basis. The Ministry has officially asked each Provincial Government to launch the project on the development of GRDP at the level of cities/districts/counties under its territorial jurisdiction.

The Ministry is expecting that each Provincial Government is able to produce statistics on GRDP at the level of cities/districts/counties for the year 2007 by the end of 2009. In this context, a workshop on the GRDP compilation methodology will be organized in October 2008, jointly by the Ministry and KNSO. All statistical personnel (around 300 persons) working at local governments is to attend the workshop. It is believed that Korea will be the first country having the GRDP at the level of lower local governments, if the Ministry's goal is achieved.

As shown in the table 3, in some other countries like the U.S.A., U.K. and Japan, statistics on Gross

Domestic Product is made available at the lower layers. However, in the case of the U.S., the GDP for 363 Metropolitan Areas is currently available on an experimental basis. The responsibility for the production of such statistics in the U.S. and U.K. is fallen into the hands of central statistical organizations not the hands of local governments, while the responsibility in Japan is into each Prefecture Government.

<Table 3> Availability of Sub-national Statistics on Gross Domestic Product in Selected Countries

Country	Statistics	Spatial units for which data are available		Agency responsible for producing
		Upper layer	Lower layer	
Korea	GDP	Available for 16 Provinces	Under development	- KNSO for provincial data. - Each Provincial Government for data at lower layer
U.S.A	GDP	Available for 50 State	Experimental figures are available for 363 Metropolitan Areas	Bureau of Economic Analysis
United Kingdom	GVA	Available for 12 Regions	Available for 37 sub-regions and 133 local areas	Office for National Statistics
Japan	GDP	Available for 47 Prefectures	Available for some cities/towns/townships	Each Prefecture Government

Thirdly, there is also increasing demand for the statistics on household income by the provincial level. However, the surveys conducted by the KNSO are not in a position to provide provincial statistics due to the small sample size. The following surveys are providing data only at the national level – monthly Farm and Fishery Household Economy Survey (2,800 farm households (5 households x 560 EAs) and 1,144 fishery households (4 households x 286 EAs) and monthly Household Income & Expenditure Survey (8,794 eligible households (10 households x 999 EAs). This implies that the statistics on household income is only available at the national level in Korea. Thus, KNSO is emphasizing to find ways to produce the statistics on household income at least at the provincial level. As shown in the table 4, in some other countries like the U.S., Canada, Australia and the U.K., statistics on household income is made available at least at the upper layers.

<Table 4> Availability of Sub-national Statistics on Household Income in Selected Countries

Country	Data published	Spatial units for which data are made available	Method of compilation
Korea	Household income on a quarterly basis.	Only at the national level	Monthly Household Income and Expenditure Survey
U.S.A.	Median household income and number of people in poverty on an annual basis.	For states, counties, school districts	Model-based estimates (Small Area Income & Poverty Estimates program)
Canada	Income for economic families on an annual basis.	For provinces, metropolitan areas	Survey of Labour and Income Dynamics (15,000 households)
Australia	Household income and median household net worth on a 5-year basis.	For states	Survey of Income and Housing (14,545 households)
U.K.	Gross disposable household income on an annual basis	For 12 regions, 37 sub-regions, 133 groups of unitary authority or counties	Estimates from taxation data and survey of personal income.

4.2 Statistics Being Developed in cooperation with Central Governments

If one look into the situation of other subject-matter areas, especially of other ministries of the Korean government, there are found to be a number of areas where very little statistical information is available below national level and in some instances at a national level. For example, such statistics as on health status, demand of laborers, tourism of the population, and poverty level are available only at a national level. Thus, KNSO is playing a role of coordination to develop statistics on health status, demand of laborers, tourism, at least at the provincial level.

Examples of results of monitoring the progress of other ministries are as follow;

1) Korea Center for Disease Control(KCDC) under the Ministry of Health, Welfare & Family Affairs was successful to increase the sample size by three times for its Survey on National Health and Nutrition. A total of 12,800 households in 600 EAs are surveyed for three years 2007-2009, implying that annual sample is 4,600 households in 200 EAs. Data collection at fields is done throughout the year by 58 interviewers including four coordinators, 12 doctors, 8 nurses. Thus, statistics on the health status of residents including prevalence of chronic diseases, health risk factors, disabilities, utilization of medical facilities at the provincial level will be available at around in first half of 2010.

2) Ministry of Labor was also successful to increase the sample size for its Annual Survey on Labor Demand. The sampled establishments have increased from 12,000 in 2006 to 32,000 in 2008. Thus, statistics on job vacancies, shortage of laborers at the provincial will be available at around in the first half of 2009. The data will be also available at the level of two digits of industrial classification and three digits of occupational classification.

3) Ministry of Culture & Tourism has committed to play a role to produce statistics on tourism at the provincial level. However, the Ministry was not able to secure budget for this purpose. Instead, the Ministry has asked each Tourism Policy Bureau of Provincial Governments develop statistics on tourism in its jurisdiction. Up to now, three Provincial Governments (Kangweon Province, Busan Special City and Kyungnam Province) started from 2008 to develop questionnaires and conduct pilot surveys. In this process, KNSO has extended its technical assistance to develop questionnaires and conduct pilot surveys.

4.3 Statistics Being Developed in cooperation with Local Governments

KNSO has established a Regional Statistics Development Team at the headquarters as well as the Regional Statistics Support Team composed of three staff-members at each of KNSO's 12 regional branch offices.

The Teams has induced the local governments to develop regional statistics for the sake of both KNSO and the local governments for the last three years. The division of roles between the KNSO and the local governments was set as follows. KNSO has done such jobs as questionnaire design, sample selection, conduct of pilot survey, data input and tabulation. In the meantime, the job of the maintaining of the main survey is to be done by the local governments.

For this purpose, KNSO has secured the budget for development of regional statistics amounted to be approximately 1 million US dollars on an annual basis. Meanwhile, the local governments were asked to take over the responsibility of conducting the main survey and bearing the cost incurred for the main survey. Thus,

the table 4 shows the eleven kinds of statistics developed jointly by KNSO and the local governments for the last two years during July 2005 ~ July 2008.

<Table 5> Pilot Surveys Conducted jointly by KNSO and Local Governments during July 2005 ~ July 2008

Title of survey	Survey periodicity	No. of local governments
Labor Force Survey	Quarterly	By 7 Cities/Districts/Counties
Labor Force Survey for Sub-provincial Level	Quarterly	By 2 Provinces
Survey on Service Industries	Quarterly	By 2 Provinces
Survey on Provincial Tourism	Annual	By 2 Provinces
Survey on Visitors for Sub-provincial Level	Quarterly	By 2 Provinces
Social Statistics Survey	Annual	By 1 Province, 16 Districts /Cities/Counties
Mining & Manufacturing Survey	Quarterly	By 2 Cities
Wholesale & Retail Trade Survey	Quarterly	By 2 Cities
Basic Agricultural Statistics Survey	Biennial	By 2 Counties
Basic Agricultural Statistics Survey for Sub-provincial level	Annual	By 1 Province
Survey on Livestock Farming	Annual	By 1 County
Survey on Crops and Cows	Annual	By 1 County

5. Problems Being Encountered in the context of Regional Statistics

Although the Korea National Statistical Office has tried to make some initiatives, it still finds two major problems as shown in the below in the contexts of regional statistics.

First of all, as mentioned in the previous section, there has been no framework on regional statistics and information development plan for regional statistics in Korea. Although many people within and out of the KNSO tend to talk that regional statistics are important, they have neglected to invest resources to develop the framework and the development plan for regional statistics. Some people, especially those who have no work experience in the fields of statistics tend to think that all statistical information is coming out automatically from the Korea National Statistical Office. In other words, they regard the production of statistics is not the inherent work of local governments.

Secondly, the number of statistical personnel of local governments is revealed to be very few. Each of 16 provinces has a statistical section with only 6 staff-members. Meantime, each of 230 lower local governments has a statistical section only with 1~3 staff-members. The more worsening matter is that the personnel tend to stay for a short period at the statistical work. Those who worked for more than three years at statistical work are found to be only 14.9% as of 1 March 2006.

These facts seem to be the reason that there is a lack of knowledge within local government of exactly what statistics are available at a sub-national level and where to obtain or how to access the data. This is particularly evident in smaller rurally-based local authorities where no one has specific responsibility for maintaining an up-to-date knowledge available data.

6. Future Plan of Korea National Statistical Office

6.1 Development of Framework on Regional Statistics

As mentioned earlier, there has been no framework on regional statistics and information development plan for regional statistics in Korea in the true sense of the term. This has resulted in the following problems as can be seen in the table 4: 1) the statistics developed are confined to a few areas, 2) only a few local governments have committed to participate in the development of regional statistics, and 3) the development of regional statistics has been done on an ad-hoc basis, not in a systematic way. In this context, KNSO is doing its efforts to develop the framework and information development plan. Currently, KNSO has made a contract with the Korea Rural Economic Institute to develop the framework on regional statistics. By the end of 2008, an analytical report on the framework will be made available.

In the course of work, the following three documents are benchmarked: 1) Review of the Statistical Needs of Local Government prepared by Statistics New Zealand in 2001, 2) Information Development Plan for Rural and Regional Statistics prepared by Australian Bureau of Statistics (ABS) in 2005, and 3) Urban Indicators Guidelines prepared by UN Human Settlements Programme in 2004. In a summary, ABS's report presents the regional statistics needed as the followings. The report published by Statistics New Zealand also shows similar statistical needs of local governments as those of the Australian Bureau of Statistics.

Demography (size and structure of population, migration)
Quality of Life
- Services (demand, availability, accessibility, affordability, quality)
- Well-being (employment, health, housing, income, assets)
- Specific population groups (foreign laborers, youth, older persons, women, persons with a disability)

Community Strength
- Human capital (education, skills, leadership, training infrastructure)
- Social capital (social networks, community activities, trust, safety, sense of belonging)
- Information networks

Economic Growth
- Structure (industry, labor market, turnover, journey to work)
- Performance (production, consumption, turnover, employment, investment, income and earnings)
- Links (imports, exports)
- Barriers (labor force skills, infrastructure, innovation, environment)

Environmental Issues

6.2 Regional Statistics Given High Priority for Development by KNSO

Table 5 shows kinds of statistics the KNSO is currently emphasizing to develop by itself or especially in collaboration with local governments. The status on three kind of regional statistics was already explained in under Section 4.1. It is reiterated in this Section in a simple format together with some other kinds of statistics.

Firstly, the KNSO itself continues to find a way to produce the statistics on household income at least at the level of provinces on an annual basis. However, it will take some years to increase the sample households due to the shortage of budget.

Secondly, the KNSO is in the process of conducting the labour force survey to produce statistics on unemployment by the level of cities/districts/counties under its jurisdiction on an annual basis.

Thirdly, the KNSO together with Ministry of Government Administration & Local Autonomy is asking for each provincial government to compile statistics on gross domestic product by the level of cities/districts/counties under its territorial jurisdiction on an annual basis. KNSO has committed itself to provide any technical assistance about the compilation methodologies on GRDP to local governments.

Fourthly, the KNSO is asking for each local government of cities/districts/counties to conduct social statistics survey on an annual basis. The survey results serve as a valuable data source for local governments' allocation of budget for social welfare programs.

Fifthly, the KNSO is also collaborating with local governments to develop statistics on tourism and statistics on agricultural sector.

<Table 6> Statistics Which Are Given High Priority for Development in Korea

Areas in statistics	Target of spatial units	Institutions responsible for producing statistics
Statistics on household income	For provinces	KNSO
Population estimates	For cities/districts/counties	KNSO
Gross Domestic Product	For cities/districts/counties	Each provincial government
Labour force survey	For cities/districts/counties	Each provincial government
Social statistics survey	For cities/districts/counties	Each local government of cities/districts/counties
Statistics on tourism	For cities/districts/counties	Each government of provinces or of cities/districts/counties
Statistics on agricultural sector	For counties	Each local government of counties

6.3 Application of the Small Area Estimation Technique

It is also worthwhile mentioning about the application of the method of small area estimation as official statistics. KNSO did two experimental studies in order to seek for the possibility of producing statistics by way of the method of small area estimation. As defined by Rao, a small area is any sub-population for which direct estimates of adequate precision can not be produced. Small area estimates are possible through a variety of technique depending on the intended use of the estimates and available resources.

In the literature, small area estimation is classified as direct and indirect estimation. A direct estimator uses values of the variable of interest only from the time of interest and only from units in the domain of interest. The most widely used direct estimator is the sample estimate calculated using the survey data from the small area of interest. The main problem with this type of estimator is that the sample size in the areas of interest is usually too small to obtain accurate and/or precise estimates. This is especially problematic for areas in which no sample at all was collected.

Indirect estimators depend on values of the variable of interest from domains and/or time periods other than that of interest. These values are brought into the estimation process through a model that depends on

one or more auxiliary variables that are known for the domain and the time period of interest. The simplest example of an indirect estimator is the use of the sample mean of the entire sample as the estimator for a specific domain. Indirect estimators can be further classified as simple indirect and model-based indirect estimators.

Thus, the first study was done for three years during 2002~2004 to find the possibility of producing overall unemployment rates by 230 Cities/Districts/Counties with data on the labor force survey. For this purpose, KNSO had contracted with a few professors of the academy. However, it had failed to produce statistics on unemployment rates at the level of Cities/Districts/Counties. Such failure was due to the following two reasons. Auxiliary information with a good quality, especially from the 2000 Population Census, was not sufficient. There was also a lack of recognition from decision-makers at KNSO on the application and utilization of small area estimation techniques.

Second one was done for the year of 2005 to find the possibility of producing statistics on household income and expenditure for major components by 16 Provinces. This job had been carried out by two contracted professors from the academy. They had made a conclusion that the statistics on household income and expenditures for major components by 16 Provinces could be published directly from the Current Survey on Household Income and Expenditure with the sample size of 8,700 eligible households. The values of CV (coefficient of variation) were found to be from three per cent to less than 20 per cent for major components of household income and expenditure. However, KNSO did not follow the suggestion. Main reason for this non-publication was due to the conclusion that it was still pre-mature for the KNSO to produce official statistics through the application of the small area estimation techniques. However, KNSO continues studies on the application of small area estimation techniques to produce official statistics.

6.4 Enlargement of Organization responsible for Regional Statistics

In the meantime, the KNSO would like to enlarge the organization in charge of development of regional statistics in Korea as soon as possible. At present, the personnel engaged in the development of regional statistics are very few. The Division of Regional Statistics & Sampling at KNSO has only 12 staff-members. Each Regional Statistics Support Team at 12 KNSO's regional branch offices has also only 3 staff-members, respectively. Meanwhile, the statistical personnel working for each provincial government are found to be only 6 staff-members on an average. KNSO will do its best to expand the organization and to increase the statistical personnel engaged in the regional statistics in the near future.

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