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ABSTRACT

The creation of a database for a spatial computable equilibrium (SCGE) model for a developing country like the Philippines is considered a bold undertaking due to the scarcity of available data. This study attempts to provide a fresh perspective on reconciling available secondary data and collected primary survey data for the compilation of a database for SCGE modeling with a transport sector in the Philippines. It presents a comparative analysis of two datasets: (1) origin-destination (O-D) tables from the 2004 Interregional Freight & Passenger Flow Survey of Japan International Cooperation Agency (JICA) and the Philippines Department of Transportation & Communication (DOTC), and (2) interregional input-output (I-O) table from the five-region social accounting matrix in the Philippines constructed by the authors. It will draw from the databases' respective strengths for the construction of a reliable database, which is the basis of a spatial computable general equilibrium model (SCGE) of the Philippines.

I. Introduction

The magnitude and direction of interregional commodity flows in the Philippines define the extent to which macro-level decisions specifically those relating to location and capacity of transport infrastructure investment, impact on major sectors within a general equilibrium context of the economy. To measure these, primary data in the form of origin-destination (O-D) surveys are conducted and secondary data in the form interregional input-output (I-O) flows which are part of a multi-regional SAM (MRSAM), are compiled. This study attempts to reconcile results from these two databases to come up with an appropriate database for transport-oriented spatial computable general equilibrium model.

There are similarities between commodity flow data contained in origin-destination (O-D) matrices and goods flow data embedded in interregional input-output (I-O) matrix, which is a subcomponent of the multi-regional social accounting matrix (MRSAM). Whereas, I-O matrix captures the movement of goods from producer to consumer, O-D matrix depicts the flow of commodities from place of embarkation to place of disembarkation. Hence, all the transaction costs, which include transport costs, mark-up margin, and distribution costs, are not considered in O-D matrix. Transport planning studies typically use O-D matrix to estimate the effects of transport sector on logistic structure and distribution channel of goods. On the other hand, interregional I-O data can be used to establish the pattern of trade from

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the initial producer to the final consumer. Connecting the two datasets would enable both transport and economic planners to measure the impact of trends in logistics and the economy due to some policy changes. While both datasets have a passenger flow component, this paper will limit itself to commodity flow component.

II. Scope & Limitations of the Study

The limit to reconciliation and revalidation efforts is defined by the ultimate objective of the creation of multi-region SAM. The improved database which will result from the methodology suggested in this exercise will be used to validate an SCGE model for the Philippines. The primary objective of SCGE modeling in this research is to assess the regional impact of transport infrastructure investment on macroeconomic variables, and interregional flows. Such results will be correlated with important social concerns like impedance in mobility, accessibility, regional distribution of welfare and environmental effects. It is widely recognized that simple SCGEs are not forecasting tools by themselves, They have no time dimension and do not allow for forecasted policy interventions over time. Standard forecasting models and SCGEs are complements because the SCGEs enrich the forecasting dimension by adding new behavioural responses to new price structures brought about by an exogenous shock. In their simplest form, SCGE models stand for a new pattern of production and consumption which will occur if households and firms strive to get to get back to an optimal position subject to their respective constraints.

The baseline data used to validate the model is a multi-region social accounting matrix (MRSAM,) . MRSAM represents transactions in a complete economic system subdivided into regions, during an accounting period. It is used to trace economic linkages between producing units and consuming units distinguished by their location. It represents an equilibrium position wherein producers and consumers are maximising their objectives within certain constraints .To complete the spatial dimension , a transport sector is made explicit together with a government sector and a capital accumulation sector.

There is no official regional social accounting matrix in the Philippines. Because of this, the construction of a comprehensive and reliable database for aforementioned modeling exercise becomes top priority. Due to the tremendous costs in terms of time, computer work , data gathering and surveying , available secondary data were collected and put together to fill in the different components of a MRSAM. These were reconciled with primary data collected by the JICA-DOTC team to reinforce the matrix's integrity. Among

these data requirements are (1) a five-region interregional input-output table with compatible dimension as those of the model; (2) international trade and interregional trade data ; (3) household income and expenditure data classified by regions ; (4) gross regional domestic product and expenditures data; (5) Census of Establishments data; (6) national input-output data, (7) commodity flow data by water and air, (8) Family Income & Expenditure data . These data sets were reconciled with the aforementioned datasets to complete the MRSAM. Regionalization of national variables utilized non-survey methods like simple location quotient method and RAS method.

The value-added of this paper is therefore to put side by side the results of secondary data (I-O data) and primary data (JICA-DOTC road interview survey data) so that the figures used in SCGE simulation earn a higher degree of confidence. Differences and similarities in data outcome will be explored. At the very least , the direction and magnitude of freight flow in primary and secondary data sources should be consistent with each other. If there is a difference, a theoretically acceptable explanation will be explored. Furthermore, this study aims to show that data used in transport planning and economic impact analysis are compatible with each other when expressed in monetary terms. In this case regional and income accounts will be used.

It must be noted that interregional flows in the Philippine interregional input-output table (PIRIO) were estimated using non-survey techniques, and secondary data from government statistical agencies. The JICA-DOTC survey was conducted at a later date than creation of PIRIO. Hence this study explores complementarities between PIRIO and JICA-DOTC survey so that a robust database is created. It also documents the efforts exerted to put spatial dimension in officially available statistics and to reconcile secondary with primary data.

It is hoped that the validation and reconciliation techniques embodied in this paper will pave the way for exploring potential complementarity between input-output data and origin-destination data of freight flow specially for developing countries where research funds are limited. The section on issues in reconciling these two sources pinpoints key issues which need to be resolved in MRSAM construction .They affect the empirical results derived from the model formulated for the the Philippines , where a substantial amount of foreign funding goes into transport infrastructure investment, Commodity flow survey data via water and air transport are available from NSO but with accounting limitations which will be discussed in later section. Since this is an initial attempt at SCGE modeling and multi-region SAM construction in the Philippines; effort was exerted in utilizing existing secondary

data using non-survey regionalization techniques and recently gathered primary data to create an improved database for the first SCGE model for the Philippines.

To gain a wider perspective of linkages between the two databases, a delineation of objectives, general methodology and comparative results of each database will be presented.

III. Objectives and Methodology of JICA-DOTC O-D Survey

(1) Objectives of JICA-DOTC O-D Survey

The primary objective of the JICA-DOTC study is to provide a common socio-economic and transport information database for planning in each of the transport sub-sectors namely road, rail, water and air transport. The particular objectives include the following: (1) Formulate the list of existing transportation routes for various modes of both passenger and freight inter-regional and intra-regional flows; (2) Formulate inter-regional transportation passenger and freight matrices by route and transportation modes; and (3) Conduct technology transfer to the counterpart personnel in the course of the study. (2004: JICA- DOTC Study)

(2) Methodology of JICA-DOTC O-D Survey

Origin-destination tables were estimated for commodity flow per transport mode. Originally, interspatial flows across the Philippines were traced among 24 zones, which were then compressed into 11 islands and finally into 5 regions which are compatible with areal disaggregation of MRSAM. Freight flow O-D tables were estimated for the following transport modes - road, rail, water and air. Freight flow via air, water and rail were derived from secondary sources, namely, 2002 commodity flow and trade statistics of the National Statistics Office (NSO). However, primary data for freight flows via road were taken from roadside interviews of drivers, freight carriers, representative bus operators and large corporations with their own freight distribution. For freight flow data, the JICA-DOTC Survey aimed to establish the volume of commodity flows in terms of number of trips and weight of each commodity type transported by all modes on an annual basis. In the case of freight flow via road, the number of freight trips captured on daily basis was expanded to a typical week OD. This was later expanded to an integrated annual OD data. Commodity flows were expressed in terms of average weight per commodity type and vehicle type. Annual totals in terms of commodity flows via air, water and rail were taken from commodity flow data of the

NSO. As stated previously, there were three zoning system used for areal disaggregation, namely: 24 zones, then 11 islands and then 5 regions. The latter 5 regions corresponded to the same five regions used in the multi-regional SAM. The distribution of roadside survey locations was based the existence of major trunk roads forming the national trunk road network. (JICA-DOTC Survey: 2004, pp.3-7, 6-12)

Data gathering for commodity flow was vehicle-based. Freight trips were classified into three main vehicle classes, namely small (jeepney, vans or pick-ups), medium (2-axle trucks) and large-sized trucks. For each of these vehicle types, average weights per commodity type were extracted from the freight survey data. The calculation of average weight per commodity carried by each vehicle type involved classifying the commodity carried by each vehicle type according to the 12 commodity types (JICA-DOTC Study: 2004).²

IV. Objectives and Methodology of Construction of Five-Region SAM

(1) Objectives of Five-Region SAM

The main purpose of constructing the multiregional SAM is to provide the database that will be used as benchmark in deriving equilibrium values of spatial computable general equilibrium model. The conceptual and accounting framework is designed, based on the closed type of multiregional SAM model, wherein the household sector is treated as endogenous within the production system. Furthermore, the model attempts to decompose the household sector into income groupings—low, middle and high-income group—to give clearer picture of welfare effects across economic groups.

(2) Methodology of Construction of Five-Region SAM

a) Scope and Coverage

A social accounting matrix (SAM) represents transactions in a complete economic system during an accounting period. It shows the generation of income by activities of production and the distribution of income between social and institutional groups. (Round 2003) When a national SAM is split into multi-regional SAMs (MRSAM), the flow of income

² The commodity classifications are: (1) unprocessed cereals, (2) agricultural food stuffs, (3) agricultural cash crops, (4) processed cash crops, (5) cereal product, (6) manufactured food stuff, (7) other manufactured goods, (8) forestry products, (9) mining products, (10) mineral oil products, (11) construction materials and (12) producer goods.

from production units to consuming units is given a spatial dimension. The 15 administrative regions of the country in 1994 (now 17) are regrouped into five greater regions following the geographic delineation used in compiling the 1994 5-region Philippine Inter-Regional I-O table (PIRIO), which is the principal data source for this study. The regional groupings are shown in Table 3. In this closed MRSAM model, (7) major industry divisions and three (3) income groups of households comprise the production sector.³

b) Methodology of Five-Region SAM (MRSAM) Construction - Three Major Activities

There were three major activities undertaken to derive the MRSAM. These were carried out in the following order: (1) expanding the Scope and Coverage of the 1994 Open-Type PIRIO Model, (2) closing the Expanded PIRIO Table and (3) compiling the MRSAM. (Dakila & Mizokami : 2006)

Interregional flow of goods was measured using non-survey techniques namely, simple location quotient method and RAS method.

A discussion on the derivation of interregional flows in 5-region IRIO is now undertaken to fully appreciate the value of this study. From the gross regional domestic expenditures of the National Statistical Coordination Board, net export data were compiled. Foreign exports of a commodity were taken from Census of Establishment data. Foreign imports were estimated using the national import content ratios as proxy indicators. This is based on the assumption that regional economies follow the national economy's consumption pattern of imported products, whether for final production or final consumption. Domestic imports were estimated using the simple location quotient (SLQ) method. SLQ ratio is the percentage share of output of industry at the regional level out of total regional output divided by percentage share of output of industry at the national level out of total national output. If the region imports some product from the rest of country, then SLQ is less than unity. These ratios are applied to sectors in the intra-regional table (net of foreign imports) for those with SLQs less than one. Those sectors with SLQs greater than or equal to one are assumed to be self-sufficient. Foreign exports were estimated using Foreign Trade Statistics Data. Domestic exports is the residual value after foreign exports are subtracted from net exports.

³ The components of MRSAM sectors are: (1) Agriculture—crops, fishery, forestry, livestock & poultry, (2) Industry—construction, mining, manufacturing, electricity, gas & water, (3) Other Services- Private Services, Finance, Insurance & Real Estate, Trade, (4) Water Transport Services, (5) Air Transport Services, (6) Land Transport Services, (7) Government Services, (8) Low Income Household Group (families with annual income below regional poverty threshold), (9) Middle Income Household Group, (10) High Income Household Group (families with annual income above 250,000 pesos).

The interregional flows depicted in PIRIO were the result of non-survey techniques used like simple location quotient. The SLQ is the embodiment of trade coefficient because it gives an indication on whether the sector is an importing sector or is self-sufficient or exporting sector. It adjusts the input coefficient downwards. The difference between the old control totals and the new control totals is placed in the imports row of the non-competitive IO table. Then readjustment to new control totals is undertaken using RAS technique. The interregional trade coefficient on the other hand is the ratio of total imports to domestic demand per sector where imports are derived from an import matrix using SLQ method and RAS method.

The five-region SAM is the final product of pioneering efforts in regional input-output table construction funded by the Japan Society for the Promotion of Science (JSPS) which started with the creation of a single region input-output table for the National Capital Region (NCR). The next step was to create a bi-regional input-output table (NCR vs. the rest-of-the-Philippines). The last step in the JSPS initiative, was to create a five-region input output table using the 2-region I-O as take off point. It was at this point that tremendous effort and resources were used by the authors to construct a five-region SAM for SCGE modeling for transport infrastructure investment appraisal in the Philippines. The mother table used for all interregional I-O and the multi-regional SAM was the official national input-output table of the Philippines for 1994.

A note on inadequate trade data for the Philippines follows. There is no direct data on regional exports and imports including domestic trade flows. While commodity flow statistics are published by the National Statistics Office (NSO), their usefulness as data source for interregional flows is limited when applied to the accounting framework of I-O analysis. (Secretario : 2002). The rigid IO rule is that flows of goods should be depicted from producer to consumer. The flow of commodities via middlemen like wholesalers and retailers are considered as part of the O-D flows but not reflected in NSO data. Other issues like existence of in-transit flows and crosshauling are not taken into consideration in compilation of existing NSO commodity flow data.

V. Issues in Aligning Inter-zonal O-D Data with Interregional I-O Data in MRSAM

There are conceptual and practical issues involved in delineating freight flow across regions in an archipelago like the Philippines.

The first issue involves the conversion of physical units to monetary terms. The objective of the OD data preparation for freight flows is to establish the magnitude of commodity volumes in terms of trips and weight under each commodity type carried by all modes on an annual basis (JICA-DOTC Survey: 2004). OD tables for commodity flows via air, water and rail were taken from National Statistics Office data. NSO annual totals are presented in physical units (metric tons) and monetary value. The usage of secondary NSO data involves tracing commodity flow from place of embarkation to place of disembarkation. For freight flows via road; primary data comes from roadside interviews with randomly selected respondents. Therefore in comparing commodity flows using O-D data from JICA-DOTC survey and from multi-regional SAM I-O data, available conversion factor, which is peso per metric ton in 1994 prices, must be utilized. Eventually, both O-D data and MRSAM I-O data are in peso terms. To do the reverse, which is to convert monetary terms to volume units – metric tons- is not feasible with current state of Philippine data. This is because, economic flow data as depicted in MRSAM when converted to physical terms is a per unit of output data and not per metric ton data. The heterogeneity of per unit of output data requires that per unit data be homogenized into per metric ton data. This distinction magnifies the difference in the notion of “quantity” in transport planning and “quantity” in economic impact studies. This is the disadvantage of expressing commodity flows in volume units rather than monetary units. Also, if monetary valuation of commodity flows is adopted, then the issue of which price should be used - producer price or consumer price - should be resolved.

The second issue is the delineation of spatial units. The disaggregation of areas into zones and eventually into regions was based on island groupings, which were later merged to become regional groupings. Clearly, the use of islands as basis of zoning emphasizes the geography of the Philippines as an archipelago. This would distinctly trace the flow of commodities from port-to-port and airport-to-airport. However, economic data are filed according to administrative regions of the Philippines and so provincial level totals have to be utilized to realign zonal groupings in JICA-DOTC O-D data with MRSAM I-O data.

The third issue is the classification of sectors. There is a need to realign classification of freight in O-D table with classification of commodities in input-output tables. Philippine input-output tables use Philippine Standard Industrial Classification (PSIC) classification. Freight flow O-D data are mainly categorized into agricultural products, manufactured goods, mining products, construction materials and producer goods. These goods are measured in units of volume. While a detailed disaggregation of the sectors is desirable, difference in emphasis in transport planning and economic research could lead to misalignment of sectors. For example, transport studies use volume-distance variables whereas economic impact studies measure welfare effects in monetary terms. The sectoral disaggregation

entails different units of measurement. Clearly a lower level of disaggregation needs to be used to trace interspatial movements of cargo.

The fourth issue concerns the survey methodology used in primary data gathering for O-D data. To meet its objective of measuring commodity flow per transport mode, roadside interviews were vehicle based. Appropriate checks can be instituted to prevent double-counting or understatement of vehicle trips per time period. Some problems include those associated with how to account for empty trucks, for data collected at different times and different time intervals for warehousing activities, and intermodal exchanges within regions. It is also suggested the transport manifests or bills of lading of firms engaged in road transport of their raw materials be used as basis for control totals of value of goods transported between two points in space and across time.

The fifth issue deals with the vastly different objectives of gathering O-D data and I-O data. O-D data are used in transport planning to pinpoint optimal transport routes, to determine optimal points of inter-modal transport systems and minimizing transport cost of goods across space. On the other hand, I-O data are mainly used in economic planning to measure inter-industry linkages and spatial spillover effects on major economic variables. Hence the degree to which O-D matrices can be adjusted to capture the entire process of movement of a good from its raw material stage to delivery of final good to the ultimate consumer depends on the primary objective of the research.

The sixth issue deals with the prices. One essential difference between MRSAM table and O-D table is that the latter is expressed in producer prices whereas the former is expressed in consumer prices. Consumer prices include trade and transport margins in delivering product to the purchaser plus the producer price. It includes the cost of intermediation cost from point of disembarkation to the point of final consumption. On the other hand, producer prices include the basic price received by the producer plus indirect taxes less subsidies on the product and excludes intermediate costs of product delivery to final consumer .

VI. Procedure for Integrating Primary Data in OD Tables and Secondary Data in SAM

The previous sections underscored the similarities between O-D and I-O data. Both trace the movement of freight and corresponding factors of production across space. However, certain improvements may be undertaken to link the two tools.

First, classification of freight in O-D table will be realigned with classification of commodities in input-output tables. Philippine input-output tables use Philippines Standard Industrial Classification (PSIC) classification. Secondly, O-D flows which are expressed in terms of volume-distance can be converted into monetary terms, using regional producer price indices for the year when the flows were surveyed. Currently, commodity flows from O-D tables are expressed in producer prices. Thirdly, the zonal classification of origin-destination areas will be converted into administrative disaggregation of regions as filed in Philippines statistical agencies. Fourthly, all commodities transported by different transport mode from different O-D pairs should be added up together to get total commodities transported from one point to the other. Fifthly, since the current official I-O data are in 1994 prices, the monetary I-O data can be converted from 1994 to 2004 prices. Alternatively, monetized volume data of commodity flow in O-D tables can be converted from 2004 to 1994 prices, depending on availability of conversion data. This procedure can be deduced from the figure below:



Figure 1 : Process of Alignment of O-D and I-O Data

VII. Empirical Results of JICA-DOTC Study and Multiregional SAM-IRIO Construction

(1) Results of JICA-DOTC Freight O-D Survey

A very important finding of JICA-DOTC O-D survey is that around 99.97% of annual commodity movement was via road. This finding may seem strange considering the fact that the Philippines is an archipelago and most of interspatial movement would be via water. One factor which may account for this result is that transport of cargo using inter-modal scheme such as the Ro-Ro (roll-on, roll-off) is classified as transport via road. It would be interesting to look at freight OD tables by all modes.

(2) Results of Inter-regional IO-MRSAM Construction

On the other hand, the interregional commodity flow of five-region I-O which is part of the SAM showed the following results. NCR was the top region which received highest

monetary value of goods as destination area. Also, Southern Luzon which includes the CALABARZON area was top region as place of origin of goods in 1994.

(3) Comparison of Results in Terms of Magnitude of Freight Flow

The results, as seen in Table 1 below, as shown by I-O/O-D ratios, indicate that monetary values of commodity flows in interregional input-output (IO) flows are higher than those in O-D tables in all regions except Northern Luzon. All ratios are greater than one except Northern Luzon. This can be attributed to the following reasons : (1) interregional I-O data includes transport costs from point of production to point of disembarkation while O-D includes only monetary value of commodities transported excluding transport margins, profit margins etc and other intermediation costs. (2) The interregional flows from I-O data include monetary value of intangibles like services which are excluded from actual interregional flow of goods in O-D tables. Therefore flows tend to be overstated ; (3) the O-D tables exclude intraregional flow of goods within NCR and have assigned a zero value to NCR-NCR transactions and (4) the concept of “quantity “in expressed differently in freight flows in O-D tables (metric tons) as compared to quantity in interregional I-O tables (output per metric ton). A side-by- side comparison of freight flow data in monetary terms of JICA-DOTC survey and MRSAM study is shown below

Table 1: Ratio of Magnitude of I-O Commodity Flow to O-D Commodity Flow

Origin	Destination					
	NCR	N. Luzon	S. Luzon	Visayas	Mindanao	Avg. IO/OD Ratio
NCR	Undefined	0.0935	0.2773	0.6301	0.6081	1.1416
N. Luzon	0.1328	1.2565	0.1586	0.7674	0.8612	0.7116
S. Luzon	0.1932	0.3978	2.2212	1.4953	3.4803	1.0642
Visayas	0.9479	308.3476	0.5600	5.4110	0.4648	2.8927
Mindanao	1.5398	2.2275	7.7946	0.3930	2.1717	1.8629
TOTAL	1.2896	0.5180	1.5411	2.0083	1.8068	
IO/OD Ratio	1.0258	62.5682	2.5105	2.1410	1.8786	1.5346

Adjustments are made so that metric ton units in JICA-DOTC survey are converted into monetary units in 1994 prices using NSO per peso metric ton conversion rate. This was deemed a better option since the concept of quantity in I-O is different from volume measurement in O-D data.

(4) Comparison of Results in Terms of Direction of Freight Flow

A cell-by-cell comparison of the direction of net commodity flow is undertaken. This is to establish similarity in the direction of movement of commodities in both data sets. The direction of flow of goods is the same for all O-D and I-O pairs with some exceptions. The exception is for commodity flows emanating from Visayas to Northern Luzon and also from Northern Luzon to Visayas. The O-D matrix shows that negative outflow of goods occurs from Visayas to N. Luzon whereas, the I-O data indicated that there was positive outflow of goods from the same pair of regions. Another O-D pair with different direction is that coming from N. Luzon going to the Visayas wherein the O-D data indicated a positive net outflow from N. Luzon to Visayas, while I-O data indicated the reverse. The reason for this discrepancy lies in the number of location sites in Visayas and N. Luzon chosen in JICA-DOTC O-D Survey. The criteria used for number of location sites per region was strategic location in transport routes. This resulted in more sites chosen in Visayas and Northern Luzon.

VIII. Conclusion

The above results indicate that there is a way of enriching the database for SCGE modeling in a developing country like the Philippines. It can be done by linking freight flows from O-D tables of surveys and interregional commodity flows of I-O table contained in MRSAM. There can be complementarities between primary and secondary data sources. Reconciliation and balancing of results can be implemented if control totals can be derived from primary data sources. Secondary sources like those from government statistical agencies can be used to balance and adjust cell entries in O-D and I-O data. A simple methodology was devised, utilizing database from both I-O and O-D tables, so that interregional flows of goods can be reliably estimated. The I-O data from MRSAM which were separately estimated initially can provide the complete monetary value of transporting a good from producer to consumer. Whereas, O-D data can provide idea of the magnitude of the flow of goods in physical units from point of embarkation to point of disembarkation. The two datasets can be used as cross –checks on each other as far as direction and relative magnitude of commodity flows are concerned..

A common point which emerges from all these is that primary survey of O-D flows must be carefully planned so that information derived meets the research's objective. This covers a wide array of factors like improvement in sample design, adopting an optimal sample size , achieving high response rate from targeted respondents by lessening

respondent burden and assuring confidentiality of response and tapping state-of-the-art technology in administering survey questionnaires within a given budget. If transport survey methods can be streamlined further so that O-D flows in physical units complement I-O flows in monetary units, then both the transportation planner and economic planner will have a rich database to work on. Given this, SCGE modeling for transport infrastructure planning and economic planning is no longer an unexplored frontier in the Philippines.

References

- Dakila CG & Mizokami, S.(2006) "Reconciling O-D Freight Flow Data & Interregional I-O/Muliregional SAM DATA for SCGE Database in a Developing Country ", Infrastructure Planning Review, Vol. 23 No.3 , August 2006, pp.725-736.
- Japan International Cooperation Agency (JICA) - Dept. of Transportation & Communication (DOTC): The Inter-Regional Passenger and Freight Flow Surveys in the Republic of the Philippines – Final Report, Dec. 2004
- Department of Finance : Annual Financial Statistics. 1995.
- National Statistics Office : 1994 Family Income & Expenditure Survey, Manila.
- National Statistics Office : 1994 Census of Establishments, Manila.
- National Statistical Coordination Board : 1994 Philippine Input-Output Tables. 1999.
- Round, Jeffery . 2003. "Constructing SAMs for Development Policy Analysis ", Economic Systems Research, Vol. 15 No.2 June 2003, pp 160-183
- Secretario, Francisco: 1994 Philippines Interregional Input-Output Table – 5 Region. JSPS-Manila P1 project, Manila Database. 2002.
- Smith, Robert 1970 ."Concepts & Methods in Commodity Flow Analysis " in Economic Geography.Vol.46 (June 1970)pp.404-416