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WASTE MANAGEMENT IN NATIONAL PLANNING (I-O-W) MODEL A NEW PARADIGM

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ABSTRACT

Input-output modeling is in vogue on the National Accounting scene. Detailed input-output tables are available for planning of National/Global system. A system is conceptualized to be a set of interactions of the three basic parameters viz Input (I) Output (O) and Waste (W). In the conventional input/output modeling and proper attention has not been given to the Waste parameter. It is advocated that Waste parameters deserve explicit consideration in view of their vital role in various systems by taking into account consideration the crises of vitally needed resources balanced economic growth. Basic framework of a generalized I-O-W (Input-Output-Waste) model has been propounded with an illustrative example. In this study an attempt is made to develop a new paradigm of National consistency modeling to incorporate WM aspects in National Planning and the awareness for a cleaner and hygienic environment.

Key words: Input/Output Paradigm WM.

INTRODUCTION

It is realized the forecasting has been as essential element of any planning process whereas proper accounting of resources is a prerequisite for reliable for casting. Input output modeling is in vogue on the national accounting scene Paul C. Njoku 2004. In this study waste management in national planning model has been made.

MATERIALS AND METHOD

An over view of input output modeling has been initiated the input output model is a very widely accepted tool to define the technological constraints and for resource balancing for any system. The Leontief's formulation defines the constraints that have to be satisfied by very viable system as total physical amount of outputs and inputs of each type of resource must be in balance. a simple input output matrix has four quadrants as shown in tables 1 a and b. the two way input output table showing the flow of goods and services among the different

sectors of economy conveniently describes its states. New rows and columns are added to the table with expansion of the scope internalizing some of the external in-flows out-flows.

The set of transactions can be expressed by the following equations;

$$\Sigma j \quad Y_{ij} \quad + \quad FD \quad I = Y_i \quad Vi \qquad (1)$$

Where Y_{ij} = Intermediate output of sector I to sector j
Y_i = Total output of sector i
FD_i = Final demand of output of sector i

As per the technology assumption of the input-out model, the input requirements for each sector can be an unchanging.

Table 1(a).: A Simple Input-Output Matrix Consuming Sectors

Producing Sectors	Intermediate Demand	Final demand	Output
	Primary Inputs	Primary inputs to Final demand sectors	
	Input		

Characteristic of the technology of production, i.e., the ratio of the inputs to total output for any sector termed as input or technological coefficient is constant over time.

Table 1(b).: Mathematical Representation of Input-output Matrix

	Consuming Sectors	**Final demand**	**Output**
Producing Sectors	**1 2…… n**		
1	**Y_{11} Y_{12}….. Y_{1n}**	**FD_1**	**Y_1**
2	**Y_{21} Y_{22} ……. Y_{2n}**	**FD_2**	**Y_2**
n	**Y_{n1} Y_{n2} ……Y_{nn}**		**FD_n**
Y_n			
Primary Inputs	V_{11} V_{12}…… V_{1n}	$V_{1, n+1}$	
	V_{21} V_{22} V_{2n}	$V_{2,n+1}$	
	V_{k1} V_{k2} ….. V_{kn}	$V_{k, n+1}$	
Input = Output	Y_1 Y_2 Y_n		

$$Yij/Yj = K ij \quad \textbf{(2)}$$

Substituting the value of $\underline{Y\ ij}$ from equation (5.2) to equation
Yj

(5.1) and rearranging,

$$FDi = Yi - \sum_j K_{ij} Y_j \quad (3)$$

Which can be written in matrix form as,

$$FD = (I - K) Y$$
$$Y = (I – K) - 1FD - 4$$

Characteristics of technology of production, i.e. the ratio of the inputs to total output for any sector termed as input or technological coefficient is constant over time.

A comparable but different set of structural relationships might be conceived in terms of output coefficient by using the market share assumption that the allocation of output from any sector to all other sector is constant.

First the final demand is estimated and by introducing the expected change input coefficients to reflect the changing technologies the output level are projected by using equation 4. However a fraction of final demand goes as waste which is not explicitly considered in the input output model.

Extension to incoporate invironmental interactions

Some extensions to the conventional input output model have been attempted in past to incorporate environmental interactions. The history of economic models of environmental externalities seems to have a short time span and most of the development in this field are quite recent. Environmental is a kind of exhaustible resource and neglecting the possibilities for recycling. They have introduced utility function depending on both the level of consumption and density of waste and have utilize the theory of optimal controls. Some other formulation that lay emphasis on waste parameter include that of Koenig and Cooper which is an application physical system theory to economic environmental ecological analysis.

Waste as neglercted parameter in national planning

A review of literature on input output modeling indicates that it gives explicit consideration to only two dimensions viz; input to the system and output from the system. Though some extension of input output model are attempted by Leontief Ayres and Kaneese and others to incorporate waste parameter their efforts were limited to deal with environmental aspect only. The detail resource balancing for different type of resources viz material energy manpower services etc. with explicit consideration of waste has not been considered in any scale model. Most models have focused on a sub set of outputs either gross or net or both. This probably may be the main cause for the lack of emphasis on waste as an explicit parameter in national resources accounting and forecasting models.

Further the survey of WM practices in Nigeria context, as reported has revealed the lack of data base on waste flow in national economy. These further substantiate the view point that existing input output tables do not give explicit consideration to waste parameters.

THE PROPOSED I-O-W (INPUT-OUTPUT-WASTE) MODEL

Recognizing the importance of waste as an independent parameter an attempt has been made in this study to add a new dimension to the conventional input output modeling practice to

incorporate WM constraints. It is proposed to remodel the economy in the frame work of an I-O-W model which will be able to define the resource balance more realistically by incorporating the reduction recycling abatement disposal and related functions of WM. It will be helpful in the WM policy evaluation and to forecast the WM practices to be followed for desired growth rate. The proposed model will also facilitated independent analysis of I, O and W parameters to arrive at the optimal part of development.

BASIC FRAME WORK

The free body diagram of the production sector of the economy could be shown. this illustrates that the sector takes inputs of resources from rest of the sectors nature trade, import and habitat along with the waste to be recycled. The output is allocated to various sectors and final users. The waste generated is either recycled or dispose off. This could be represented as system graph of the inter sectoral resource and waste flow in a three sector economy of which is WM sector. The WM sector is input oriented while other sectors are output oriented.

CONCLUSION

The basic framework of I-O-W model defines I-O-W flow matrix I-O-W coefficient matrix and consistency equations. A basic frame work of I-O-W partition matrix of national economy should be obtained. In this formulation the economy is conceptualize to be composed of three production sectors viz; primary, secondary and tertiary and three WM sectors viz, reduction, recycling and abatement. The model may be generalize for 'S' production sectors and 'Z' WM sectors. The sources of primary input are broadly classified into three categories viz trade habitat and nature. The input from trade include all kinds of imports while the input from habitat mainly constitute manpower services etc. It is conceptualize that no material inputs are available from the habit expect the words. the input from nature include different grade of resources which may be either in the form of or energy or space.

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