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Mathematical Analysis for Sugarcane Industry in Maharashtra

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Abstract

The sugar industry in Maharashtra is one of the most significant and large scale sugar producing areas in the country. The sugarcane industry is the foundation of the sugar industry. It is a source of raw material for the sugar industry. In this paper we have discussed that mathematical models can be applied in both areas, however the researcher has chosen to focus on the sugarcane industry. i..e. agricultural sugarcane production.

Keywords: Sugarcane industry, Economic equilibrium, mathematical model, input-output analysis

INTRODUCTON:-

The sugar industry in Maharashtra is one of the most significant and large scale sugar producing areas in the country. The pace of growth in sugar production has been tremendous in the last few years. The latest sugar production figures in Maharashtra show that the country is doing better than other states. The sugarcane industry, which is the backbone of co-operative work in Maharashtra, can be strengthened if the mathematical programming techniques are properly adopted. It is necessary to differentiate between the sugar industry and the sugarcane industry. The sugar industry is the sugarcane and the sugar production in the sugarcane industry is the cultivation of sugarcane and the growth of sugarcane. The sugarcane industry is the foundation of the sugar industry. It is a source of raw material for the sugar industry. Mathematical models can be applied in both fields; however the researcher has chosen to focus on the sugarcane industry i.e. the production of sugarcane in the field. In this paper an attempt is made to apply input-output analysis to sugarcane cultivation and sugar industry.

REVIW OF LITRETURE

Singh S. P., Parashar Anil K. & Singh H. P. (1977), in their research entitled, "Econometrics and Mathematical Economics", have focused on Econometrics and Mathematical Economics. According to the authors, "Economics is a method now widely used in economic research. Today its study covers widespread fields of economic life and embrace a variety of economic problems. These methods consist of the application of modern statistical procedures to theoretical models formulated in mathematical terms. Econometric methods are of paramount importance to the verification of economic laws and are also potentially useful for the formulation of new economic laws and governmental policies."

Thomas L. Saaty (1959), in his valued work entitled, "Mathematical Methods of Operations Research", has discussed at length with reference to use of mathematical methods in operational research. The main purpose of this work is to present some mathematical methods essential to operation research. This study on the historical background of operations research sets forth general ideas on the subject, to provide perspective. The remaining eleven chapters pursue the task of examining specific ideas and illustrating specific methods. The mathematics of this work is divided essentially into two parts – one on methods of optimization and another on the theory of probability and on statistical methods. The last chapter, which is an essay, challenges the reader to approach problems creatively and includes a collection of elementary problems as illustrations.

MATHEMATICAL AND NON MATHEMATICAL ECONOMICS:-

Since the economics of mathematics is only an approach to economic analysis, it should in no way differ, nor should it, be different from the nonmetal approach to economic analysis. The aim of any theoretical analysis is always to derive a conclusion or theorem from a set of theorems or theorems through the process of reasoning, regardless of point of view. The main difference between "mathematical economics" and so-called "literary economics" is mainly explained in mathematical symbols and equations rather than in words; In addition, instead of literary logic, mathematical theorems are used - in the process of reasoning, there must be multiplicity. Symbols and words are indeed the same (testifying that symbols are usually defined in words)

The problem of input output analysis is primarily technical. The amount of medium products used in the cane and sugar production process and the available resources are related to the state of technology to a certain extent.

INPUT – OUTPUT ANALYSIS

Input output analysis is a technique for analyzing inter industry relations here sugarcane cultivation and sugar production. It is an analysis of the interdependence of the economy as a whole and studies the pattern of movements of intermediate products from one industry to other industries and the consumers. Input output analysis, thus,

considers general economic equilibrium empirically, by a study of the interdependence of the production plans of industries in the economy. An input output table shows, at a point or over an interval of time, the structural characteristics of an economic system in the form of statistical data and a method of analyzing and understanding the system.

Input output is a name given to the attempt to take account of general equilibrium phenomena in the empirical analysis of production. Demand theory plays no role in the hard core of input-output analysis. The problem is essentially technological. The investigation seeks to determine what can be produced, and the quantity of each intermediate product which must be used up in the production process, given the quantities of available resources and the state of technology.

Input-output analysis is an empirical investigation. This is primarily what distinguishes it from the work of Walras and later general equilibrium theorists. A consequence of this no doubt long-overdue concern with the facts is that compromises have been forced on the investigator. Input-output employs a model which is more severely simplified and also more narrow in the sense that it seeks to encompass fewer phenomena than does the usual general equilibrium theory. Its narrowness lies in its exclusive emphasis of the production side of the economy. Its oversimplifications I shall discuss presently.

Input-output seeks to take account of the interdependence of the production plans and activities of the many industries which constitute an economy. This interdependence arises out of the fact that each industry employs the outputs of other industries as its raw materials. Its output, in turn, is often used by other producers as a productive factor, sometimes by those very industries from which it obtained its ingredients. Steel is used to make railroad cars and railroad cars are, in turn, used to transport steel and the coal and pig iron which are used in its manufacture.

ASSUMPTIONS OF INPUT OUTPUT ANALYSIS:

A number of simplifying assumptions have to be made in analysis. Each industry produces a single, homogeneous product sugarcane/ sugar. To relax this assumption to some extent the single product may be considered as a composite product made of several items used in it in fixed proportions. There is only one primary input, i.e., labour. Final demand is from consumers only.

In any productive process all inputs are used in fixed proportions and increase in input is in proportion with the level of output. Production takes place through processes with constant technical coefficients. In other words, input output relations are assumed to be linear relations of direct proportionality. Production in each industry is subject to constant returns to scale. The sugarcane producing sector consists purely of competitive firms.

The output of any industry sugarcane becomes either the input of another industry sugar or the final demand or, it is added to the inventory of the industry. If, for any firm, total input equals total output, it is in equilibrium. If input exceeds output, inventories pile up, creating problems. Alternatively, if output exceeds input, inventories are exhausted. An industry may use some of its own product. Such use may be considered as a sale to

the industry itself.

The input output relations are technical in nature and not conditions of market equilibrium. The analysis is static, though easily extended to comparative statics e.g. by varying final demand.

All transactions may be considered in terms of money values since money is a suitable common unit for aggregating inputs and outputs of industries. Quantities and prices can also be considered for transactions.

In order that the total demand for the product of any industry be just sufficient we should know the level of output of each industry under consideration. Since the industries are interdependent the output levels must be consistent with the input requirements in the economy. This is to avoid difficulties in analysis.

Output / Input	**Interindustry Sector**		**Final demand sector**	**Total output (sales)**
	Agr.	**Ind.**	**Consumers**	
Sugarcane	300	600	100	1000
Sugar	400	1200	400	2000
Consumers (Primary input)	300	200	0	500
Total input (cost)	**1000**	**2000**	**500**	**3500**

Row 1 Column 1: 300 is the amount produced as well as consumed by the sugarcane cultivation agricultural sector.

Row 1, Col. 2: 600 is the amount sold by agriculture sugarcane to industrial sector sugar industry.

Row 1, Col. 3: 100 is the amount sold by agriculture sugarcane to household sector consumer.

Row 2, Col. 1: 400 is the amount sold by industry sugar to agriculture and so on.

Row 3, Column 3: The consumer or household sector sells nothing to itself. However, it produces "labour" and services: 300 (Row 3, Column 1) and 200 (Row 3, Column 2). The total of these two 300 + 200 = 500 (Row 3, Column 4) is, therefore, the sum of wages and salaries received by the consumers or household sector.

It can be seen that a transactions matrix is useful in the study of the structure of the producing sector. It shows the way in which the productive activity is distributed throughout the economy. The method applied to the economic system can help in

predicting the response to any changes made in the system.

CONCLUSION:

Input output analysis is a technique for analyzing inter industry relations here sugarcane cultivation and sugar production. It is an analysis of the interdependence of the economy as a whole and studies the pattern of movements of intermediate products from one industry to other industries and the consumers. Mathematical programming is however, not a branch of economic theory but a separate discipline by itself having its own selection of economic principles and methods. In essence, mathematical programming rests on the edifice of programming.

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