

# UNITED ARAB REPUBLIC

## THE INSTITUTE OF NATIONAL PLANNING



Memo No. 958

### BASIC ECONOMIC CONCEPTS FOR HEALTH PLANNERS

by

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May, 1970







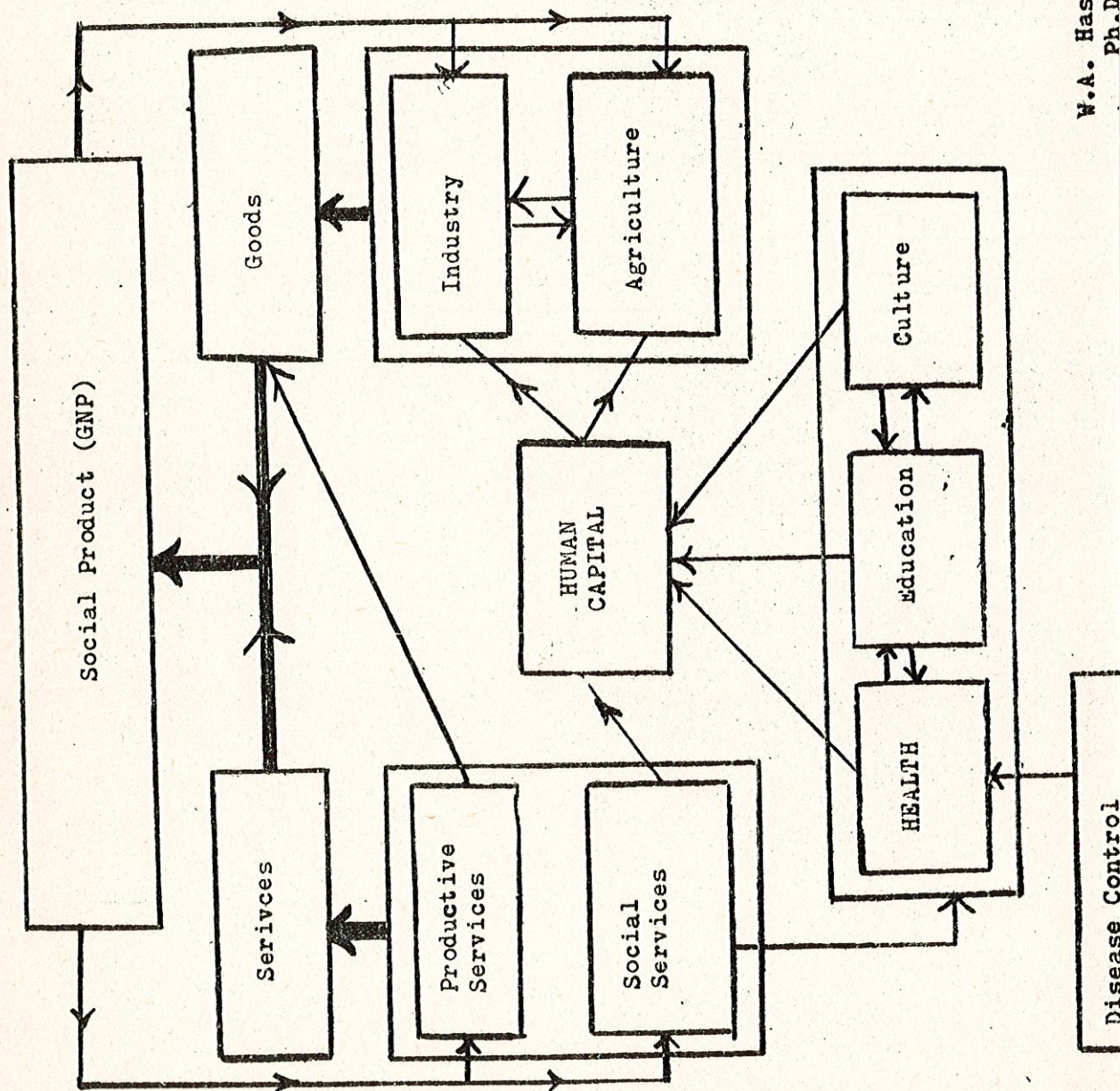
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# HEALTH AS A MANAGEMENT TOOL FOR DEVELOPMENT



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## I. INTRODUCTION

In this publication the author presents some basic economic concepts. Stress is laid on definition and illustration of certain economic and accounting concepts which are useful to those interested in public administration in general and in particular, to those concerned with health administration.

The paper is merely an introduction to the concepts presented. Its focus is on national product and income accounting. Financial and cost accounting concepts are discussed with hypothetical hospital examples.

The reader is cautioned that the economists' function is one of studying choices. He does not judge them in his role as economist. There is nothing in economic analysis itself which gives the ultimate answers to what is right or wrong in individual or national conduct and while it provides planners with a useful tool, of itself economic analysis is not a magic formula by which programs for the betterment of mankind can be tested.

Section II deals with the major economic concepts with emphasis on macro-economics and Section III deals with these accounting concepts which will help the health planner to distinguish between accounting and economic terms, since the two disciplines often use the same terms but mean slightly different things because of their difference in focus.



## II. ECONOMIC CONCEPTS

The major part of our discussion will be in the realm of what is called macro-economics. The discussion of the formulation and distribution of social product as well as the discussion of national income accounting are both in the realm of macro-economics. It is well, therefore, to distinguish between the terms before proceeding further.

Micro-Economics is the study of particular firms, households, individuals, prices, wages, and incomes. In micro-economics the focus is on the study of demand and supply, marginal analysis and on theories of the individual firm and industry.

Macro-Economics is the study of the aggregates and averages of the whole economic system rather than with particular items. Thus, the policy significance of macro-economics at the level of the nation-state is extremely important.

We can also look at a particular sector both in terms of macro and micro economic analysis. Thus, with the health sector it is clear that the study of how individual suppliers of health services function and of how health "firms" such as hospitals function is in the domain of micro analysis. So too, is the study of demand elasticities of individuals for health services. The study of the health care delivery system as a whole, as an aggregate, is however, in the domain of macro-analysis. One of the major difficulties in macro-analysis is that many economic prepositions which hold true for individuals are not born out in the aggregate.

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### National Product (Social Product) and Income Accounting

Producers (firms) knew that when the economy is prosperous there is higher demand for their goods and/or services and vice versa. Hence the importance of total production and national income.

Production and income cannot be measured in real terms ( that is to say, you cannot add ardabs of corn or wheat to kintars of cotton or onion to hours of services and so on) therefore we measure these things by the value of production and income stated in money terms. Thus we can estimate the £E value of different goods and services and add them as a measure of national production and income and further we can then compare national production from year to year by adjusting the £E, the monetary value according to a base year. The total value of all goods and services produced in a given year is called in economics the GROSS NATIONAL PRODUCT (GNP) and in socialist countries our term SOCIAL PRODUCT is identical to GNP. SP (GNP) is composed of many elements. We can break it down into various levels such as NATIONAL INCOME, PERSONAL INCOME, and PERSONAL DISPOSABLE INCOME<sup>1</sup> and analyze these components. It is useful however to consider how money expenditures and income, which represent the flow of the economy, operate.

### The Flow of Money Expenditure and Income

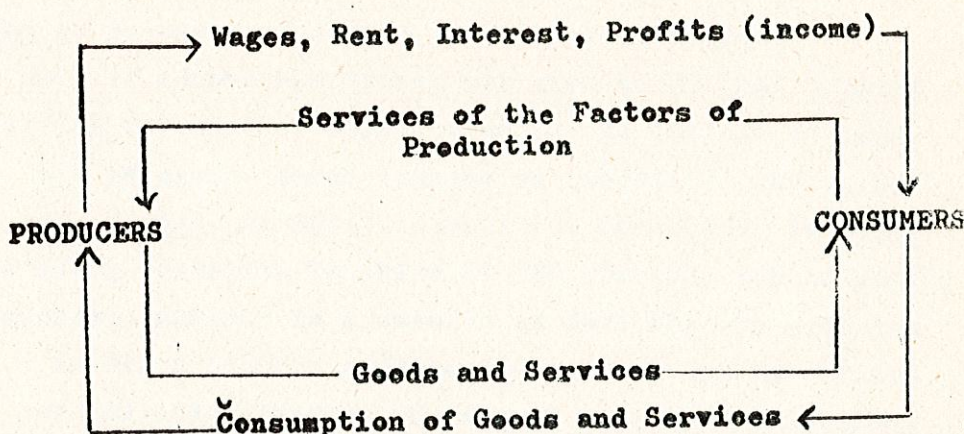
Consumers buy consumption goods (food, clothes, drugs, doctors services etc.) and producers buy labour, materials, equipment, and finished goods.

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Purchases require expenditures of money which becomes incomes to those who receive them (individuals and firms. We can conceive of this in terms of two flows as shown in the following diagram.<sup>1</sup>

Payments for the following



Payments for the Above

Consumers provide productive services to producers in the form of labour, land, capital and entrepreneurship. These four are called the factors of production. In return the consumers receive income in the form of wages, rent, interest, and profits. Received incomes are spent for goods and services produced by firms and the money is again paid out to the productive services. Expenditures and income then are merely two ways of looking at the same thing and they are merely two aspects of what we may call the "Circular Flow of Income".

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<sup>1</sup>Ruderman, A. Peter. Summary of Economics Course in Health Planning. The Johns Hopkins University. Baltimore Md. (May 13-17, 1963). p. 3.



We have already mentioned the concept SOCIAL PRODUCT or GROSS NATIONAL PRODUCT. Now we will devote more time to analyze this concept. Since we said that GNP is the total market value of all the goods and services produced in the nation's economy for a given period of time it is useful to note what we mean by nation here. The nation's economy is a concept which includes all the national factors of production, that is the organization of labour, land and capital and entrepreneurial services which are provided by the residents of the nation. It therefore includes all the productive aspects of the government, public and private sectors of the nation.

GNP can be measured in two ways:

- (1) Add all the expenditures made for the goods and services produced during the period, excluding all the values of intermediate products in the process of creating the final or end products; or
- (2) Add the incomes and costs for which the expenditures were made.

Both approaches add up to the same total.

We will look now at the first approach, the adding of expenditures. For the second approach any standard introductory text in economics will contain the delineation of the income approach to the GNP.

#### Adding of Expenditure to Arrive at Social Product (GNP)

Calculate the market value of what has been produced in the economy by adding the expenditures for purchases of various goods and services in connection with the following:

- (1) Personal consumption expenditure; (2) Gross private domestic investment; (3) Net foreign investment; and (4) Government purchase of goods and services.

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These four are inturn broken down as follows:

- (1) Personal Consumption Expenditure
  - a. Durable and nondurable goods(e.g. food & cars)
  - b. Services
- (2) Gross Private domestic investment
  - a. new construction
  - b. Producers' durable equipment
  - c. Changes in business inventories
- (3) Net foreign investment
  - a. Net change in the relative value of exports and imports of goods and services
  - b. the amount of gifts and receipts
- (4) Government Purchases of goods and services
  - a. General expenditure for goods made by all levels of government
  - b. General expenditures for services made by all levels of government.

Another way to discuss these same four points in order to clarify the components is as follows.

- (1) Personal Consumption Expenditures is the market value of all consumer goods purchased for direct consumption by individuals, families, and non-profit institutions (schools, hospitals).
- (2) Gross Private Domestic Investment includes the total value of capital goods and inventories created in the economy during the current period. It includes newly created capital goods produced or acquired by the private sector and it reflects changes in the values of inventories of goods held by business firms so long as those changes are not due to price changes but to real changes.



(3) Net Foreign Investment is the flow of goods and services between Egypt and other countries. This concept is utilized in calculating the amount of the gross national product and is the difference between the total amount of money or money claims that flow into the economy from abroad and the amounts that flow out. The figure here would be the net change. The excess of the amount of our products and services sold abroad over the amount purchased from other countries. The total amount paid for Egyptian capital and services employed in production abroad over receipts for similar purposes received from foreign countries. And finally, cash gifts and contributions to Egyptians from abroad over cash gifts and contributions made by Egypt to foreigners.

(4) Government Purchases of Goods and Services includes all the expenditures at all levels of government except for purchase of land and used assets produced in a former period; transfer payments (since no good or service is represented and it would be counted twice since it is already included in personal consumption income); interest on government bonds and other securities. It includes salaries for employees; compensations; outlays for government enterprises, government consumption, and net purchases by the government from abroad.

The total of expenditures = GROSS NATIONAL PRODUCT (GNP) =  
SOCIAL PRODUCT (SP).



One often sees reference made to GROSS DOMESTIC PRODUCT. This concept is particularly useful when one wishes to look at a value of the country's own production, for GDP differs from GNP by excluding net factor incomes received from abroad and thus relates the product to the product of the resident producers of the country.

There are many more definitions and distinctions that can be made but for our purposes these will suffice and we will now turn our attention to the concept of how economists go about the business of economic programming. We will follow closely the simple model developed by Ruderman which consists basically of studying the interrelationships between different components of GNP. The symbols used are as follows:

$P$  = GROSS DOMESTIC PRODUCT (GDP)

$t$  = the subscript identifying a year (time period)

$I$  = Investment (i.e., capital formation)

$K$  = Capital

$D$  = Depreciation (provision for consumption of fixed capital)

Ruderman's program can be based on four relationships:

(1)  $P_t = C_t + I_t + D_t$  is an identity which simply says that the value of the national product is the sum of the value of consumption expenditure, the sums invested in capital formation and the sums put aside to cover depreciation.

(2)  $K_t = K_{t-1} + I_{t-1}$  is an identity which states that the value of capital in year  $t$  is the sum of the capital existing in the previous year plus the investments in capital formation made in the previous year.

(3)  $D_t = d(K_t)$  states the relationship between depreciation in year  $t$  and the amount of capital in year  $t$ . The coefficient  $d$  is the depreciation rate.

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(4)  $P_t = a(K_t)$  states the relationship between gross national product and the amount of capital, commonly referred to as the capital-output relationship. The coefficient  $a$  is the ratio of output to capital.

In order to see how these identities and relationships can be used in economic programming, let us assume some values for the coefficients. On the basis of actual studies, the relation between capital and output in a number of developing countries has been of the order of  $a = 0.5$ , meaning that two units of capital investment are needed to produce one unit of production, while the combination of obsolescence, wear-and-tear, and replacement costs leads to  $d = 0.1$  (depreciation at the rate of 10% per annum) as a not unreasonable value. Of course these values differ from country to country but we will assume these above for our illustration.

Algebra tells us that, when the coefficients  $a$  and  $d$  are given and a production target is set, the needed value of  $K$  is determined from the relationship  $P = aK$  and the value of  $D$  from the relationship  $D = dK$ , while the value of  $I$  is determined by the difference between present and needed  $K$  that is between  $K$  ( $K_{t+1} - K_t$ ). Knowledge of  $D$ ,  $I$ , and  $P$  determines  $C$  from  $P = C + I + D$ . The setting of a production target for an economy, in other words, determines the values of the other variables and enables us to analyze the repercussions involved in meeting that target.

The evaluation of a simplified programming model over time is illustrated in the following figure.



# PROGRAMMING MODEL

| TIME PERIOD | K     | P     | C    | I    | D    |
|-------------|-------|-------|------|------|------|
| t           | 200   | 100   | 70   | 10   | 20   |
| t+1         | 210   | 105   | 69.2 | 14.8 | 21   |
| t+2         | 224.8 | 112.4 | 74.1 | 15.8 | 22.5 |
| t+3         | 240.6 | 120.3 | 79.4 | 16.8 | 24.1 |
| t+4         | 257.4 | 128.7 | 85.0 | 18.0 | 25.7 |

Assume that in time period t the capital stock of the economy is 200, leading to production in that year of 100 ( $a=0.5$ ) and with depreciation of 20. Assume further that the population has chosen to dispose of the remaining 80 by consuming 70 and investing 10. In year t+1 the investment leads to a capital of 210, production of 105, and depreciation of 21.

At this point, instead of leaving the choice between consumption and investment to chance, let us say that a development program is established with the target of increasing production more than in the past, by 7 percent per annum compared with the 5 per cent increase from year t to t+1.

The target increase of 7% would require production of 112.4 in year t+2. This in turn requires 224.8 of capital an increase of 14.8 over the previous year, which requires an investment of 14.8. This in turn leaves only 69.2 for consumption, which is the classical "belt-tightening" than any community must undergo for purposes of accelerated growth when high investment demands lead to reduced consumption for what, it is hoped, will be a short and transitory period.

The 7% increase leads to a production target of 120.3 for year t+3, and the required investment of 15.8 leaves more than the year before for consumption, because production has been increased enough to permit a rise in both C & I, and the same process can be traced in the subsequent year.



In practice, things seldom work so simply. If the value of  $\alpha$  were 0.3 instead of 0.5, for example-i.e., if more capital were needed for a unit increase in output-investment would have to be higher and consumption correspondingly less. The relationship between capital and output is not stable, but in fact changes as part of the development and growth process. Above all, it may not be feasible to reduce consumption in order to obtain the desired investment-for political reasons, because of poor administration, because of popular resistance, etc. In a free market economy, furthermore, businessmen will not necessarily invest in desirable industries or in the wished-for amounts.

Finally, the demographic factor must be taken into account. If, for example, the population increases at 3% per year, the level of consumption of 70 in year  $t$  would have to be 72.1 in  $t+1$ , 74.3 in  $t+2$ , and 76.5 in  $t+3$  merely to maintain the same position per capita. On this demographic assumption, belt-tightening would have to go on in year  $t+2$  as well as  $t+1$ . In general, the higher the rate of population growth, the greater is the pinch on consumption if investment to reach a production target is to be achieved.

The simple arithmetic of our model should not permit us to assume that economic events are either as predictable or as uncomplicated as we have presented. The real world also has foreign trade and foreign aid, and the position of the "isolated state" of the model may be either better or worse depending on its foreign trade position and the aid available to it.

Now that we have taken a look at a general programming model of an economy it is useful to consider another useful tool provided by economics and that is the input-output table. We will examine this concept in the context of sectoral planning.



## Sectoral Planning

The purpose of constructing global programming models like the example just presented is to foresee the consequences of a planning decision and to estimate the requirements for investment. Investment decisions cannot be made in the aggregate alone, since the total figure is the sum of countless decisions for individual economic activities-oil wells, mines, quarries, farms, factories, ships, schools, hospitals etc. After an overall production target is decided, the details must be spelled out for each sector of economic activity. While the number of sectors for which separate plans have to be made may run into the hundreds and require the services of computers, the principle of sectorial planning can be illustrated by the simple three-sector model of Figure II which is called an input-output table. Inputs are shown in the columns and outputs in the rows.

II. SECTORIAL PLANNING INPUT/OUTPUT TABLE

| INPUTS↓<br>→ OUTPUTS |             |          |          | FINAL  |       |
|----------------------|-------------|----------|----------|--------|-------|
|                      | AGRICULTURE | INDUSTRY | SERVICES | DEMAND | TOTAL |
| AGRICULTURE          | 5           | 30       | -        | 65     | 100   |
| INDUSTRY             | 10          | 40       | 10       | 90     | 150   |
| SERVICES             | 10          | 10       | -        | 120    | 140   |
| VALUE ADDED          | 75          | 70       | 130      | -      | -     |
| TOTAL                | 100         | 150      | 140      |        | 390   |

The purpose of the table is to show the flows between the sectors and to final demand. In the illustration for example, the total output of agriculture is 100, of which 5 represents inter-farm transactions, 30 sales to industry, and 65 sales to consumers (final demand is the same as consumers).



Industry sells 10 to agriculture, 40 to other industries, 10 to the service sector, and 90 to consumers, while the service sector sells 10 to agriculture, 10 to industry, and 120 to consumers.

Viewed in the input direction (columns) 5 of the 100 output of agriculture represented purchases from other farms, 10 represented purchases from industry, and 10 purchases for services. The difference between the inputs and the value of the output, 75, represents the value added in the agricultural sector e.g. farms buy 5 of seed from other farms, 10 of tools and fertilizer from industry, and 10 of services (technical consultation, insurance, etc.) to produce 100 of output. The 75 of value added represents the remuneration of farm labour, depreciation of buildings, etc., other costs of production, and the profit of the farmer.

This input-output table can be used in planning. For example, if there is an industrial production target, i.e., a given increase in final demand for industry, the table will show the increase in inputs from agriculture, services, and other industries needed to reach the target. Likewise if there is an increased target for medical and other health services it would affect the three sectors. If resources in one sector are limited, the table will show that a target might be inconsistent with such resources. The amount of increase in input associated with a given increase in output is known as a "technical coefficient". In practice computation is extremely laborious and, when the sectors are many and narrow, or related to individual industries, often requires the use of computers.

In addition to the above, input-output analysis can be supplied to a variety of smaller-scale problems. It has recently been attempted in the case of hospitals, to analyze relations between different departments and services. It can probably be adapted usefully to study hospital services at the community level. There is no magic to the term input-output. It is simply a useful scheme of analysis like the familiar scatter diagram and a host of other statistical tools.



### III. COST ACCOUNTING CONCEPTS

Thus far we have looked at the macro picture of the economy by looking briefly at the way in which national accounts are constructed in order to get a better grasp of what Social Product or GNP really is and how it is made. We further looked at a programming model which illustrated how difficult it is to achieve increases in levels of living in the real world situation. Now we wish to focus attention briefly on cost accounting because of its importance in making possible the construction of such economic entities as national accounts for without cost accounting in individual firms and government enterprises it would not be possible to construct the inter-industry tables which are the basic data for the input/output table of an economy.

In addition to getting a better idea of cost accounting per se we will attempt to look at its utility at the micro level for the health field by trying to analyze the role of cost accounting in a hospital.

This discussion of cost accounting concepts will in no sense prepare any of us to be cost accountants and it is not intended to do so, rather it is intended merely to introduce the topic and to try and get some grasp of the importance of cost accounting as a management tool for running any on-going operation with more than one product or service in a sound business-like way.

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Accounting, like economics recognizes the concepts of fixed and variable costs but accounting is concerned with the individual firm, company, governmental operation or hospital while economics is, at least in our discussion above, concerned with the macro or general picture. One of the first things to note about accounting is that accounting is concerned first and foremost with actual costs. Actual refers to the cost represented by an actual payment, thus for example, one would record a purchase of a new stethoscope at the cost one actually paid for it, say £E 50 and not what one could get on the market for it in a country where stethoscopes were very dear. So we say that accounting costs are real costs or actual costs and not some other valuation. Another example would if I purchased a book in Cardiology by a famous Cardiologist, which was autographed by the man, for £E 10., its price in my accounting records would be £E 10 regardless of the fact that I would "value" it far more because of the autograph! So in accounting one must be concerned with actual costs when recording costs of assets, in the books of entry and when developing the accounting statements of valuation such as the Balance Sheet and the Income Statement.

What is the utility of cost accounting? This is the first question we must answer. If for a given household, group medical practice, or hospital the precise utility of cost accounting cannot be identified or if the cost of implementing a cost accounting system outweighs the benefits of such a system then there seems little justification of instituting such a system.



Cost accounting is above all a management tool which provides management with the precise data necessary in order to control costs and thus maximize profit (in commercial enterprises, for-profit enterprises etc.) or to minimize loss (in services such as health which, like most hospitals operate as not-for-profit institutions, or churches, and other charitable type organizations).

#### How does Cost Accounting Differ from General Accounting?

General Accountings' utility consists in the fact that general accounting is concerned with classification (by means of the chart of accounts), recording (in the books of original entry and general ledgers) and interpretation of business transactions so that periodic summary statements can be prepared which indicate either:

- (1) the historical results of the transactions; or
- (2) the financial condition of the business at the end of the fiscal period;

in the two basic accounting statements called the Income Statement (sometimes called the profit and loss Statement) and the Balance Sheet.

From this definition it can be seen that general accounting is the basic management tool. It provides management with the total cost of manufacturing a product or rendering a service. Hence, general accounting is quite adequate for purposes of information and control if the business is producing only one product or rendering only one service. If there are many different products or services the information obtained from general accounting sources (i.e. total cost) of operations, is not very helpful for control purposes and it becomes necessary to have the tool we call cost Accounting so that it is possible to determine the cost of producing and selling each article or of rendering each service, not at the end of a fiscal period, but at the time the article is being manufactured or the service is being rendered.



Hence, cost accounting is an expansion, and in-depth analysis, of general accounting. Management can exercise control only if it has readily available detailed figures of the cost of material, labor and overhead as well as of selling and administrative expenses of each product or service.

From what has been said so far it is obvious that implementation of a cost accounting system requires a great deal of detailed information which has to be processed either by manpower or by computer hence the stress again on the importance of careful consideration before it is decided to implement a cost accounting system. With respect to such a decision some examples may be helpful. In the ordinary household we would not expect to find a cost accounting system in operation since the household is one entity and expenditures (costs incurred) are made for one purpose-- the "service rendered" is one, that of keeping the household healthy and happy. Now if we had the responsibility of managing a rather large extended family, (fathers, mothers, uncles, cousins brothers, sisters etc. all under one roof) we very well might want to have a cost accounting system in order to exercise control over the various sub-families within the extended family, if we did then each sub-family would become what in accounting is called a "Cost center" and all of its costs of operation would be attributed to it. Then sub-families could be compared and decisions made as to whether one sub-family was expending a greater proportion of total extended family resources in relation to its size, than was warranted.

Another example can be taken from the health field. Presumably the G.P. practicing by himself would not want a cost accounting system whereby material cost, direct labor and overhead was allocated according to the specific requirements based on medical need of each patient--no most doctors would dread this because they are accustomed to charging an exorbitant mark-up to everyone! Even presuming that a doctor attempted to establish a fee structure absolutely in line with actual cost of materials



labor and overhead, it is seldom that he could set up a cost accounting system simply because it would be a greater burden in terms of the time it would consume than it would be worth to him as he would probably have to hire an accountant to do it. However, when we come to the group-practice or poly-clinic then there are advantages of a cost system for the degree of specialization encompassed and the distribution of overhead would indicate that it might be useful to attempt to allocate materials, direct labour (physician time would be calculated according to some pattern for the various specialists) and overhead of the clinic or group-practice.

If we look at a hospital of course the usefulness of cost accounting is obvious for these costs can be traced to the recipients (i.e., the individual patient). From the patients point of view cost accounting should be established in every hospital but unfortunately even in many of the so called developed countries cost accounting in hospitals is woefully lacking. However, third party payers are serving as a main stimulus to hospitals to institute sound cost accounting procedures for often such third party payers as the government or private insurance organization will not reimburse hospitals which are not at least beginning to implement such a system.

Let us look at certain cost accounting concepts and then we can better see how they apply to a hospital situation or other health service. In manufacturing, where cost accounting was first developed, there are basically two types of cost accounting the first called JOB ORDER COSTING and the second PROCESS COSTING. The following quote defines and describes these two forms of cost accounting:

#### JOB ORDER COSTING

The first step in measuring a product's cost is to decide on the costing unit-- that is, whether to try to accumulate costs separately for each unit of each product, for each separately identifiable group of units of each product, or for all the units of



of product produced in a given department during a period of time. This choice depends to a great extent on the way in which production is organized. In shipbuilding for example, each ship typically represents a very large proportion of the production volume at any one time. It is thus both easy and informative to trace many costs to one particular ship or another. The costing unit for unit cost determination in this case is the job or production order, and each job consists of one unit of product. In other cases, each job order covers the manufacture or assembly of a number of identical units of a given product. Even in shipbuilding, it is customary to cost parts of the job separately, and many subjobs may consist of several identical units. In both of these situations, the method of unit cost determination is known as job order costing.

Job order production is typical whenever the production volume in any one product is too small to justify devoting production facilities exclusively to it for any significant length of time. Examples of this kind of situation abound in industries in which a sizable proportion of the output is to individual customer specifications (e.g. automotive repair shops, job printing plants and management consulting firms and other service businesses). It is also common whenever the work in any time period is concentrated on a relatively small number of product units (e.g. shipbuilding and building construction).

#### PROCESS COSTING

The second major type of production system is continuous processing, used whenever production facilities are devoted exclusively to the production of a single product or highly similar products for long periods of time. Petroleum refining, basic steel production, glass manufacture and large portions of the chemical process industries utilize continuous processing techniques. If the nature of operations is suitable for process costing, each production cost center corresponds to one stage in the production cycle and has a relatively homogeneous output--that is, each



unit of output is similar enough to every other unit to permit output to be measured by a simple unit count. Costs and output statistics are accumulated for each process center during a specified period of time such as a month. The average cost computed from these figures is then assigned to each unit of the process center's output for the period. This is repeated for all process centers, and the total unit cost of finished products is the sum of these unit costs. The product costing unit, in other words, is the total output of a department or process center during a given time period. Because departmental output is assumed to be homogeneous, no attempt is made to assign costs to specific job lots or batches. Process costing is also applied to joint production, in which the output of a processing stage consists of two or more separate products. In this case, the lack of a single common unit of output creates some difficulties in the calculation of average unit cost, requiring some means of weighting the outputs of the various joint products ... Because product cost in process costing is also departmental cost, however, unit product cost is often used to provide departmental information in ways that are not possible under job costing.<sup>1</sup>

From these definitions we can see that a variation of Job Order cost accounting is most suitable to an hospital setting. The physician writes up a "job order", we might say, for his patient when he makes the admission diagnosis and his orders. Each patient is a unique unit in terms of the medical costs which are necessary to insure the desired service, that is, his return to some desired functional state of health. Such costs as type of room he has are generally treated like a hotel accomodation and are generally determined on an average cost per patient day basis which is not strictly speaking job order costing.

<sup>1</sup> Shillinglaw, Gordon. Cost Accounting: Analysis and Control Illinois: Richard D. Irwin, Inc. 1967. pp. 79-80 and 109-110.



It is evident that detailed costs of clinical services should be required in order to fairly bill the patient who has received such services and that these costs should reflect only the portion of total costs that are directly attributable to the specific clinical service in question but in this area hospitals are just beginning to implement cost accounting systems which delineate accurately department-by-department costs.

Part of the problem with the lack of good cost accounting in hospitals consists in the fact only in the last 20 years has hospital administration come to be recognized as a profession of its own. Indeed, for many years, and in many places to this day, hospitals were considered little more than the physicians workshop and little attention was paid to the administrative aspects of rendering health care on a sound business basis. With the advent of the computer however, cost accounting has become feasible as the computer allows for on-line instantaneous communication of patient data from many sources and has made it possible to overcome many of the obstacles to implementing a complete cost system in a hospital. In order to discuss the role of cost accounting more thoroughly it is necessary to define some basic cost accounting terms and to distinguish accounting terminology from economic terminology. The following definitions are the basic definitions in cost accounting.

DIRECT MATERIALS - Are those entering into the article manufactured or into an identifiable service. INDIRECT MATERIALS - are those used in the operations of the production but which do not become a part of the article manufactured or of the identifiable service rendered. They serve to facilitate the operations. The fundamental criterion of the distinction is whether or not it is possible or expedient to attempt to identify the cost of the materials with specific units of the product, or in some cases, with departments or processes.



DIRECT LABOUR- consists of that portion of the factory labor cost which can be directly identified with specific jobs or in some cases with specific departments or processes.

INDIRECT LABOUR consists of that portion of the labor cost which is not possible or practical to identify with specific jobs or with specific departments. With reference to our example in hospitals, direct labour would be associated with the inputs of nurse-hours nurse-aid hours with regard to each patient service center. That is, all manpower costs of a particular patient service center would be direct labour. Housekeeping labour costs would be treated as indirect labour costs.

OVERHEAD - refers to those costs which cannot be identified with specific jobs or departments or processes. The costs of general services applicable to all operations or the costs of services too small to be allocated specifically to jobs or departments are manufacturing overhead costs or simply overhead costs if we are talking about a service organization. There are three types of overhead costs: fixed overhead costs, variable overhead costs, and semivariable overhead costs (sometimes referred to as step costs because, when graphed these costs appear in a step-wise formation).



With these basic cost accounting definitions in mind we can proceed to take a closer though vastly simplified look at the implications of cost accounting for the hospital as well as some of the obstacles to its implementation.

If a hospital is a not-for-profit type of service organization it is to be supposed that its goal is not that of profit maximization. Service organizations such as hospitals, in order to operate do, or at least top management (i.e., hospital administrator Board of Directors) should; become concerned that attempts are made to minimize costs within the constraints of what is considered good medical care.

Cost accounting is a useful tool for management for it "tells" management what costs are being incurred and how they deviate from standard costs for the item in question. The management should then be in a position to act on that signal and to make certain decisions that would reduce the amount of variance between the actual cost and the standard. Let us look at an example.

We said that DIRECT MATERIALS are those which enter into the identifiable service. Now clearly pharmaceuticals are of this nature. The drugs and other pharmaceuticals are direct materials which enter into the service of returning Mr. X to some functional state of health. These DIRECT MATERIALS (drugs) become a part of the Job Order-Mr. X at the point in time when Dr. A, who is treating Mr. X dictates his orders. So far so good. We have a record of this type of DIRECT MATERIALS for Job Order-Mr. X in the cost center which we will call the pharmacy.



FIXED OVERHEAD COSTS fluctuate very little in total amount during the accounting period regardless of the quantity of production. Most fixed items are based upon the time element such as week, month, or year, not on the quantity of production. Hence, the per unit cost of fixed overhead costs will vary inversely with the volume produced. Some fixed overhead costs would be as follows:

Taxes on the hospital plant and equipment; rent of the hospital plant or equipment (such as computer equipment). Depreciation of hospital plant and equipment; various types of insurance such as fire, theft etc. Executive salaries; pension costs; and maintenance and repairs of buildings and grounds.

VARIABLE OVERHEAD COSTS are those which fluctuate in proportion to the volume of production. The variability may be in direct proportion and at the same rate as the quantity or volume of production. They include such items as indirect materials costs, spoilage and salvage costs and reconditioning costs. There is another group of variable manufacturing overhead costs which vary with the volume of production, but not necessarily in the same ratio. It is a much larger group and is called semivariable or step costs. They are of two kinds: Those which change at various levels, that is, they remain constant until a certain level of production is reached, and then must be increased, but the increase is not continuous, but on a step or plateau level, in this category are such items as supervision costs. And, second, those which vary continuously but not in the ratio of volume changes. This includes such costs as fuel and power; maintenance and repair of equipment, and depreciation of equipment. The per unit costs for variable overhead remains relatively fixed regardless of the volume of production. The per unit cost for the semivariable overhead fluctuates inversely with the production but not to the same extent as the fixed overhead costs.<sup>(2)</sup>

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(2) Shillinglaw, op. cit., p. 279  
and Neuner, John J.W. Cost Accounting: Principles and Practice  
Richard. Irwin, Inc. 1957. pp. 18 - 23.



Now assume that Mr. Abu, the hospital administrator happens to be reviewing DIRECT MATERIALS-PHARMACY and notes that there is a 20% variance between the actual cost of the pharmaceuticals for Job Order-Mr. X and the standard (i.e., actual costs are 20% higher than the standard). Mr. Abu realizes that Mr. X is ultimately the one who will bear the brunt of this over-variance when he gets his final bill but Mr. Abu, the Hospital Administrator, notes that this variance is one he as administrator has no control over. Why?

In most hospitals the facts are that though time and time again the medical staff have been advised to order by generic rather than trade name of drug, they do not. All Mr. Abu can do is advise, he cannot do anything which would cause the doctors to say that he is dictating medical practice. Dr. A., who is treating Mr. X still insists on ordering by trade name although he knows that the generic name drugs though cheaper, are the same as the trade name drugs.

The situation is further complicated by the fact that the pharmacy overhead costs, a portion of which are allocated to Job Order-Mr. X, are higher than standards indicate they could be. The reason is that for every patient condition there seem to be enumerable drugs and each doctor has his favorite drug for each condition, which does not necessarily correspond to what has been proven to be the best drug for the condition! Hence the pharmacy is forced to stock many more types and styles of drugs than are actually even remotely necessary in terms of what will meet the needs.

Where doctors are salaried employees of the hospital or polyclinic this overhead cost factor can be greatly reduced for administration has a greater say in determining the pharmaceuticals inventory.



So, with the example of the pharmacy we have seen the effect of a DIRECT MATERIAL and of a particular type of OVERHEAD cost in relation to our patient, Mr. X. What about the cost, DIRECT LABOUR? Clearly, if Mr. X consumes private duty nurse time the DIRECT LABOUR attributed to Job Order-Mr. X is rightly billed for such man-hours of private duty nursing he receives.

As we said previously, nurse time, nurse-aid time and orderly time may also be considered direct labour in relation to each patient. There is a problem here however, when it comes to the actual practice in hospitals. In most hospitals the direct labour cost is not allocated according to cost accounting. What usually happens is that the cost per patient day for private, semi-private and ward accommodations includes a flat rate for nursing service. This is clearly not fair to the patient and is a cost that administration could control if it implemented a thorough cost accounting system. Let us consider an example.

Let us assume that Mr. X and Mr. Y both have semi-private accommodations and that the cost per day is £E 16 semi-private. Further assume that this figure can be subdivided into the following components:

SEMI-PRIVATE ACCOMODATION PER DAY

|                  |          |
|------------------|----------|
| Direct Labour    | £E 8     |
| Indirect Labour  | 1        |
| Meals            | 2        |
| General Hospital |          |
| Overhead         | <u>5</u> |
| Total Cost/Day   | £E 16    |



Now Mr. X is in the hospital for 2 days for routine lab work. He never sees a nurse or is seen by one. The nurse-aid attends to all of his needs. Mr. Y on the other hand, in the hospital for 2 days also but he has surgery on the first day. He is seen and attended to both by the nurse and the nurse-aide on both days of his stay.

Both Mr. X. and Mr. Y receive the same bill for hospital accommodations, that is £E 32, though their bills differ in other respects. Mr. X, being a cost accountant realizes that this is unfair to him and he carried his complaint to the administrator, Mr. Abu.

As our story turns out, Mr. Abu was delighted with the opportunity to discuss cost accounting with Mr. X and he offered him a job on the spot. Mr. X accepts and as he now has implemented a cost accounting system we are able to figure out what the accommodation portion of his bill should have been. Let us assume that Direct Labour of a Nurse per semi-private accommodation is £E 6 and that of an aide or orderly is £E 2. We can recompute the bills as follows:

#### SEMI-PRIVATE ACCOMODATION PER DAY

|                                 | Mr. X        | Mr. Y        |
|---------------------------------|--------------|--------------|
| Direct Labour                   |              |              |
| Nurse                           | - 0 -        | £E 6         |
| Nurse Aide and Orderly          | 2            | 2            |
| Indirect Labour                 | 1            | 1            |
| Meals                           | 2            | 2            |
| General Hospital Overhead       | <u>5</u>     | <u>5</u>     |
| Total/Day                       | £E <u>10</u> | £E <u>16</u> |
| Total Stay                      | 2 days       | 2 days       |
| Total Semi-Private Accomodation | £E 20        | £E 32        |
|                                 | ===          | ===          |



According to the above Mr. X should have come away from the hospital \$E 12 richer than he did, if there had been a cost accounting system of this detail while he was in the hospital as a patient.

Let us consider another type of cost and consider the case of Mr. X and Mr. Y again. We saw on their bill for accommodations that part of the cost of semi-private accommodation was called General Hospital Overhead. Mr. X, in his new job, as the chief cost accountant, has become concerned over the fact that in the past patients have always been charged a flat rate for this component of the cost per day for the various types of accommodations offered by the hospital. Mr. X further notes that the hospital % of occupancy fluctuates greatly from 50% of capacity (occupancy) during certain seasons to 98% and even 100% of occupancy (capacity) in other seasons and yet the charge for General Hospital Overhead is the same.

Mr. X is concerned with two elements of the General Hospital Overhead cost, the fixed and the semi-variable cost elements. While it is true that the total amount of fixed cost will hardly vary over the accounting period (i.e., one year), it is also true that per unit fixed costs will vary inversely with the % of occupancy.

Moreover, Mr. X is concerned that there is no allowance made for the fact that the semi-variable overhead, or step costs, have not been considered for they too fluctuate inversely with the % of occupancy, although not in direct proportion to occupancy as do the fixed costs. He finds that the General Hospital Overhead portion of the accommodation charge/day for a semi-private room can be broken down as follows:



BREAKDOWN OF GENERAL HOSPITAL OVERHEAD FOR A SEMI-PRIVATE ACCOMODATION DAY AT VARIOUS % OCCUPANCIES

|                                    | <u>50%</u> | <u>75%</u> | <u>100%</u> |
|------------------------------------|------------|------------|-------------|
| GENERAL HOSPITAL OVERHEAD          |            |            |             |
| Fixed                              | £E 2       | £E 1.5     | £E 1        |
| Variable                           | 1          | 1          | 1           |
| Semi-Variable                      | <u>1.5</u> | <u>1.5</u> | <u>.5</u>   |
| Total GH0 at Various % Occupancies | £E 4.5     | £E 4.0     | £E 2.5      |

Mr. X further remembers that both he and Mr. Y were in the hospital when it was operating at 100% of occupancy and he has the clerk recompute what their respective hospital bills should have been after taking into consideration the necessary adjustment for the GH0 cost component of the accomodation charge. The adjusted charge is as follows:

SEMI-PRIVATE ACCOMODATION CHARGE AT 100% OCCUPANCY  
FOR ONE DAY

|                           | <u>Mr. X</u>  | <u>Mr. Y</u>   |
|---------------------------|---------------|----------------|
| DIRECT LABOUR             |               |                |
| Nurse                     | £E - 0 -      | £E 6           |
| Aide                      | 2             | 2              |
| INDIRECT LABOUR           | 1             | 1              |
| MEALS                     | 2             | 2              |
| GENERAL HOSPITAL OVERHEAD |               |                |
| Fixed Overhead            | 1             | 1              |
| Variable Overhead         | 1             | 1              |
| Semi-Variable Overhead    | <u>.5</u>     | <u>.5</u>      |
| Total/day                 | £E <u>7.5</u> | £E <u>13.5</u> |



Mr. X's total bill therefore should have been £E 7.5 x 2 days = £E 15 and Mr. Y's should have been £E 13.5 x 2 days = £E 27.

As part of his cost accounting system Mr. X has had printed on the patient bills a description of each cost item. He has also attached a form for patients to register any complaints they have about any portion of their bill. Mr. Abu has received reports from his Public Relations Director that the best thing the hospital ever did was to put in the cost accounting system since the patients and the third party payers are delighted with the results.

Mr. Abu considers that the cost of implementing the system are far outweighed by the benefits and he is having Mr. X work with the doctors on the problem of controlling pharmaceutical costs. Mr. X found that part of the reason the pharmacy was overstocked was that the purchasing agent in the pharmacy had received substantial kick-backs from the numerous detail men from the pharmaceutical companies. Hence overstocking was not allways the fault of the doctors. Needless to say the pharmaceutical purchasing agent was fired!







