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**THE MEASUREMENT OF
GROSS DOMESTIC FIXED CAPITAL
FORMATION IN INDONESIA**

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THE MEASUREMENT OF GROSS DOMESTIC FIXED CAPITAL FORMATION IN INDONESIA

I. INTRODUCTION

1. Economic theory as well as empirical experience confirm that the significant differences in the level of economic development and rates of economic growth among countries or in the same countries over time are, to a great extent, interrelated with the differences that exist in the level and composition of the capital stock. Ideally, capital stock is build-up by the accumulation of capital formation regularly done. Therefore economists have for a long time used the estimate of capital formation as well as capital stock in their analysis of the results of productive activity. Estimate of the gross stock of capital assets and capital formation are frequently used in determining the magnitude of and changes in productive capacity.

The general theme of capital formation lies at the very centre of the problem of development in developing countries. The so-called developing countries, as compares with developed areas, are less equipped with capital in relation to their population and natural resources.

2. The meaning of capital formation is that society does not apply the whole of its current productive activity to the needs and desires of immediate consumption, but directs a part of it to the making of capital goods such as: building and other structure, plant and equipment, transport facilities, tools and instruments, machines, and all the various forms of real capital that can so greatly increase the efficacy of productive effort. The term is sometimes used to cover human as well as material capital, which include investment in skills, education and health. However, this paper would rather limit the discussion to the problems of capital formation in developing countries; with special reference to the estimation of gross domestic fixed capital formation (GDFCF) of Indonesia, in a summary fashion.

II. CONCEPT AND DEFINITION

3. Final consumption expenditure on gross domestic product (GDP) consists of goods and services used by individual households or the community, government, producers to satisfy their individual or collective needs and wants. One of the component of GDP expenditure is GDFCF. The activity of gross domestic fixed capital formation is restricted to institutional units in their capacity as producers, being defined as the value of their acquisitions less disposals of fixed assets. Fixed assets are produced assets; mostly machinery, equipment, buildings or other structures but also including some intangible assets, that are used repeatedly or continuously in production over several accounting periods (usually more than one year).

4. The general nature and purpose of the distinction between GDFCF and consumption, whether intermediate or final, is clear. The distinction is fundamental for economic analysis and policy-making, Nevertheless, the borderline between consumption and GDFCF is not always easy to determine in practice, certain activities contain some elements that appear to be consumption and at the same time appear to be capital formation. In order to try to ensure that the system is implemented in a uniform way decision have to be taken about ways in which certain difficult items are to be classified. Following are some examples. Expenditures on training and research or development do not lead to the acquisition of assets that can be easily identified, quantified and valued for balance sheet purposes. Such expenditures continue to be classified as intermediate consumption, therefore, eventhough it is recognized that they may bring future benefits. Another example of the intrinsic difficulty of trying to draw a dichotomy between consumption and gross fixed capital formation is provided by repairs and maintenance. Ordinary maintenance and repairs undertaken by establishments to keep fixed assets in good working order are intermediate consumption. However, major improvements, additions or extensions to fixed assets, both machinery and structures, increase their capacity or prolong their expected working lives count as GDFCF.

5. GDFCF is measurement by the total value of a producer's acquisition, less disposals, of fixed assets during the accounting period plus certain additions to the value of non-produced assets realised by the productive activity of institutional units. Fixed assets are tangible or intangible assets produced as outputs from processes of production that are themselves used repeatedly or continuously in other processes of production for more than one year.

6. There is substantial diversity in the different type of GDFCF that may take place. The following main types may be distinguished:

(1) Acquisitions less disposals, of new or existing tangible fixed assets, subdivided by type of asset into: (a) Dwellings; (b) Other buildings and structures: (c) Machinery and equipment; (d) Cultivated assets.

(2) Acquisitions, less disposals, of new and existing intangible fixed assets, subdivided by type of asset into: (a) Mineral exploration; (b) Computer software, (c) Entertainment; literary or artistic assets.

(3) Major improvements to tangible non-produced assets including land.

(4) Cost associated with the transfers of ownership on non-produced assets.

7. The ideal approach to estimate of GDFCF is the direct methods mentioned earlier. The value of the acquisitions less disposals of fixed assets of a producers is given by the sum of: (i) Value of fixed assets purchased; (ii) Value of fixed assets acquired through barter; (iii) Value of fixed assets received as capital transfers in kind; (iv) Value of fixed assets retained by their producers for their own use, including the value of any fixed assets being produced on own account that are not yet completed or fully mature; less sum of: (v) Value of existing fixed assets sold; (vi) Value of existing assets surrendered in barter; (vii) Value of existing fixed assets surrendered as capital transfers in kind.

8. Different method to estimate the GDFCF is also operationally feasible, namely the commodity flow approach. The approach utilized data on the supply of materials or goods intended for use as fixed capital formation. The value of domestically produced capital goods used for capital formation plus identified imported capital goods, less export of capital goods will form the GDFCF of the country.

III. THE INDONESIAN EXPERIENCE

9. In several areas of economic analysis there are discrepancies between theoretical concepts and their empirical measurement. It is often insufficient simply to describe what is to be measured; usually there must also be some notion of intended use before a concept can be quantitatively defined in a suitable way. The actual choice of methods adopted, however, tends to be conditioned by the availability of data and this sometimes implies the use of approximate estimates that may impart an unintentional distortion.

10. The Indonesian GDFCF consist of the acquisition of new capital goods domestically produced, and new or second-hand capital goods imported from abroad. Capital goods are buildings and structure, and machinery and equipment used in the process of production of Indonesian economy. The method applied to estimate GDFCF of Indonesia is commodity flow approach. This approach utilized the data on supply of goods (fixed assets) intended for capital formation. Manufacturing Industries statistics and Foreign Trade statistics are the main sources of data for the measurement of GDFCF. Beside, information and parameters also derived from various special surveys designed for the compilation of GDP, Input-Output Table, Social Accounting Matrix, Flow of Funds Accounts and other related macro economic indicators.

11. Fixed Capital Formation in the Form of Building and Structures

Buildings and structures as capital goods are the output of construction sector. This output is calculated by the sum of the value of material input for the construction of buildings and structures, and expenses on services and primary input (gross value added) of the sector. Included in construction materials are machineries and equipments directly installed in construction/building.

To obtain the value of building materials at the location of construction activities, transport costs and trade margins should be added. Construction material originating from domestic production consist of agricultural products, such as, bamboo and wood, mining and quarrying products, such as sand, stone, asphalt,

etc.; and manufacturing product of construction materials. The construction materials from import are usually the products of manufacturing industry.

12. The ratio of the construction material utilized for construction activities and the trade and transport margin for the respective commodities, are obtained from a special survey. Other costs, as a certain percentage of the value of all the above mentioned materials, and the value added ratio, are also obtained from special survey.

13. Fixed Capital Formation in the Form of Machinery and Equipment

Data on value of machinery and equipment for fixed formation, originating either from import or domestic production are available annually from the Import and Manufacturing Statistics. To obtain the value of machinery and equipment at user's location, the trade and transport margin as well as other cost must be added. For commodities used both as capital and for other purposes, the value is split up using the ratio of capital goods obtained from a special survey.

14. Estimation of Capital Formation at Constant 1993 Prices

Capital formation, in the form of construction at constant prices, is based on the construction sector output at 1993 constant market prices, for which the calculation is separated for each component. Construction materials of domestic manufacturing production and several other commodities are calculated by extrapolation, using the production indices of the respective types of goods as the extrapolator.

Meanwhile, for imported construction materials, the calculation is conducted by using the wholesale price index of imported construction materials as the deflator. Further, the value of capital formation in the form of domestically manufacture machineries and equipments at 1993 constant market prices is calculated by extrapolation, using production indices of the respective types of goods as the extrapolators, whereas for the imported ones it is conducted by deflation, using import price index as the deflator.

15. The effort to measure GDFCF of Indonesia using direct method has been started for several sectors such as Large and Medium Manufacturing Industry, Mining, and Construction sector from which the data on establishment report available annually. The report elaborate output and input structure at current price of the respective sector. Those information derived from the result of Economic Census 1986 and will be available from the coming Economic Census 1996.

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Table 1. GDFC OF INDONESIA AT CURRENT MARKET PRICES
(Billion Rupiahs)

Type of fixed assets	1991	1992	1993	1994	1995	1996
1. Building and Structures	39,469.20	46,772.32	62,176.87	77,042.82	94,485.09	115,951.61
2. Machinery and Equipment	19,280.87	17,625.04	16,181.76	17,476.71	21,360.27	26,280.31
3. Transportation	6,109.99	4,901.23	4,951.67	7,023.56	8,559.36	6,710.22
4. Others	2,627.67	3,457.79	3,356.98	3,837.51	5,486.11	12,455.83
Total	67,487.73	72,774.38	86,667.28	105,380.59	129,890.82	161,397.96

Table 2. GDFC OF INDONESIA AT CONSTANT MARKET PRICES
(Billion Rupiahs)

Type of fixed assets	1991	1992	1993	1994	1995	1996
1. Building and Structures	48,507.85	54,537.30	62,176.87	71,013.92	80,187.40	90,109.38
2. Machinery and Equipment	20,442.91	17,969.53	16,181.76	17,173.78	20,051.49	24,388.02
3. Transportation	6,681.94	5,160.69	4,951.67	6,706.57	7,669.59	5,914.33
4. Others	2,854.97	3,634.15	3,356.98	3,694.69	5,031.93	11,101.18
Total	78,487.67	81,301.67	86,667.28	98,588.96	112,940.42	131,512.92