STATISTICAL COMMISSION
Sixth session
Item 10 of the provisional agenda

STATISTICS OF CAPITAL FORMATION
(Memorandum prepared by the Secretary-General)

and

Technical Appendix
DEFINITION AND MEASUREMENT OF CAPITAL FORMATION
1. In 1938 the League of Nations published a preliminary study, *Statistics relating to Capital Formation: A Note on Methods* (Studies and Reports on Statistical Methods No. 4), prepared by the Committee of Statistical Experts. This report had its origin in a resolution of the Council of the League, in accordance with a recommendation of its Financial Committee, requesting the Committee of Statistical Experts to take up the question of financial statistics, and to study and report upon the methods by which the comparability of financial statistics might be improved. Following a suggestion made by the Financial Committee, the work in this field had been directed at the outset to a study of the "statistics relating to the formation of capital and the manner in which that capital is invested."

2. The first part of the report describes the general features of the process of capital formation, with a view to showing the complexity of the problems involved and to arriving at a first broad subdivision of the whole field. The second part deals with the definitions and with the possibilities of a statistical measurement of the three main aspects of the problem as outlined in the first part. The third part sets out the conclusions. For practical reasons, the Committee did not find it feasible to submit recommendations for all the statistics that may be used in the preparation of statistics of capital formation. The Committee, however, believed "that the measurement of the value of capital goods offers the greatest promise of practical results in the near future, since were production statistics are available, fewer changes in existing statistics and less creation of new statistics are required."

3. Since 1938 there has been considerable progress in the economic theory and analysis of the process of capital formation. The experience of the depression period and the need to formulate policies aimed at greater economic stability led to a revision of economic theory and caused statistical research to develop into unexplored directions. The strategic role of capital formation and saving was understood at an early stage. The empirical verification of business cycle theories on the basis of statistically observed facts, the analysis of current economic trends and the study of problems concerning the maintenance of full employment have greatly stimulated research into the conceptual and statistical
problems involved in measuring national income and expenditure, capital formation and other related aggregates. There has also been a considerable advance in the study of problems of economic development which has stressed the importance to the under-developed countries of measuring national income, gross national product and other totals including gross and net capital formation. It has come to be realized that the impact of plans for economic development can be fully understood only on the basis of information on the total available resources and the part devoted to public and private capital formation. Equally important is the problem of the methods to be used for financing economic development. In this field, too, knowledge of the size and distribution of the national income and of the available internal and external sources for financing capital formation is very helpful.

At its fourth session, the Statistical Commission expressed the view that there was an urgent need to bring up to date the report of the League of Nations Committee of Statistical Experts to take advantage of recent experiences in compiling statistics of capital formation (E/1212, paragraph 76). At its fifth session, the Commission received a memorandum by the Secretariat on the progress of work on national income, capital formation and other related subjects (E/ON.3/89). The Commission requested the Secretariat to include in its study on the methods for measuring capital formation a survey and analysis of the methods used in various countries which obtain estimates of capital formation by means of questionnaires addressed to the enterprises or agencies in which the investment takes place. It also recommended that the technical study on capital formation be completed (E/1696/Rev.1, paragraphs 72 and 75).

5. The present memorandum, including the Technical Appendix, has been prepared in response to this request. The Appendix is based on information collected by the Statistical Office of the United Nations from member Governments engaged in the study and measurement of capital formation. Views expressed in the professional literature have also been taken into consideration. From replies received and the information that may be derived from publications, it may be concluded that even in countries with highly developed national income statistics work on capital formation statistics is still in an exploratory stage. In many countries the available statistics of capital formation represent only rough estimates and detailed analysis of the conceptual and methodological problems involved has not yet been completed. Because of the provisional and fragmentary
character of several of the replies received, the Statistical Office believes that publication of information for the countries separately would not yet serve a useful purpose. To the extent possible references on differences in methods which may be considered of general interest have been incorporated mostly in footnotes.

6. It is hoped that the attached Technical Appendix may be of assistance to governments preparing, or planning to prepare, estimates of capital formation and wishing to be informed about recent developments. The report represents an attempt to review the conceptual and methodological problems involved and it contains proposals aimed at greater international comparability of concepts and classifications. The object of this memorandum is to set out certain conclusions and recommendations which appear to be of special concern and interest to the Statistical Commission. Detailed aspects will be dealt with separately, in a technical study which the Statistical Office of the United Nations plans to publish using the attached Technical Appendix as a basis. As may be seen from the Appendix, there remain several problems of methodology for which solutions can only be found after more research has been devoted to them and more information obtained on the experience of various countries. The most important of these questions are the following:

(a) The methods used for adjusting figures on capital formation as derived from census of production data, imports statistics, and similar sources of information, for transportation, installation and distribution charges, whether paid for or carried out in own enterprise, as well as engineers' and architects' fees, real estate dealers' profits, entrepreneurs' overhead costs, fees paid to banks and other payments which must be considered part of the total cost of an investment.

(b) The methods and criteria used for allocating figures on the production and imports of commodities such as automobiles, furniture, typewriters, stoves, refrigerators, washing machines, etc., among consumers' durable goods and capital goods, according to their destination.

(c) The methods used for determining the percentage of the production and imports of semi-finished capital goods and parts which are used for replacement and therefore enter into gross capital formation and the percentage which enters into the output of other final capital goods and therefore should be left out to avoid duplication.

// (a) Too little
(d) Too little is known about the actual depreciation rates used in various countries for different types of assets; also on the methods of depreciation adopted (for example whether a constant or a declining percentage of the original cost).

(e) Too little is known about the reliability of estimates obtained through questionnaires addressed to the enterprises where the investment takes place; it would be particularly useful to have more information on the experience obtained with sampling procedure, for example, for estimating capital formation in the rural areas of under-developed countries.

(f) The use of substitute data in those cases where statistics of the output of capital equipment are available for certain census years only.

7. The Statistical Commission may wish to adopt the following recommendations based on the conclusions reached in the Technical Appendix.

(a) Countries compiling estimates of capital formation are requested to adopt the definitions proposed in the Technical Appendix. If countries find that their needs are more effectively served by adopting a somewhat different set of concepts, it is suggested that the relevant items be published separately together with detailed information on the criteria adopted. This may be recommended, for example, with respect to the treatment of outlay on repairs and maintenance, cost of installations, additions, remodeling, capital formation carried out in own enterprise, expenditures on soil improvement, development cost in mining, changes in inventories with producers and distributors.

(b) Countries preparing or planning to prepare estimates of capital formation are requested to adopt the Divisions and if possible also the major groups of the International Standard Industrial Classification of All Economic Activities as a basis for a classification by the industries where the investment takes place. When this is not practicable or justified by the importance of particular major groups, a classification into broader divisions may be used. Since house-ownership is not included as a separate division in the International Standard Industrial Classification of All Economic Activities,
residential building should be added as a separate category. Particularly if estimates have to be prepared for the under-developed countries, it may be suggested that small-scale and cottage industries be separated from manufacturing industry and that estimates be prepared for both categories. Similarly, it may be desirable to separate large-scale plantations supplying world markets from the largely non-monetary subsistence economy.

(c) To be useful for purposes of economic analysis it is suggested that separate estimates be prepared for the following categories:

(i) Producers' equipment;
(ii) Non-residential structures;
(iii) Housing;
(iv) Inventories.

In general, the usefulness of the classification for purposes of economic analysis increases if a more detailed breakdown can be shown. Non-residential structures, for instance, may be subdivided into industrial, public utility, commercial and public buildings, following the Divisions and Major Groups of the International Standard Industrial Classification, with possible further subdivisions by industries or technical character. Equally important is a further subdivision of the estimates into investments made by corporations, unincorporated business enterprises, private non-profit institutions, and public authorities.

(d) It is suggested that countries undertake a systematic investigation into the data on actual depreciation rates of different types of assets in order to improve the estimates of capital goods annually used up in the productive process.

(e) It is suggested that countries undertake independent studies of annual saving by major sources and of other means for financing capital formation, and that attempts be made to reconcile the data thus obtained with independent estimates of total capital formation.

(f) Countries preparing estimates of capital formation or planning to prepare such estimates may wish to undertake a systematic survey of the
basic statistics available with a view to suggesting improvements which may result in more reliable estimates of capital formation. The attention of governments, particularly of the under-developed countries, is drawn to the usefulness of sampling methods, for example, in the obtaining estimates of capital formation, particularly in rural areas.

(8) It is suggested that countries prepare estimates of capital formation in current as well as in constant prices, and that particular attention be given to the problems involved in compiling price indices that may properly be used as deflators.

(9) The Statistical Commission may also wish to seek the subject of statistics of capital formation under review and to request the Secretary-General to draw the attention of governments to the Commission's recommendations on this subject, and to the technical study to be issued.

9. Finally the Statistical Commission may wish to recommend that the Economic and Social Council adopt a resolution in the following terms:

The Economic and Social Council recommends:

Taking note that the Statistical Commission has drawn up a series of recommendations aimed at improving the compilation of statistics of capital formation and making them more comparable, and

Taking note that the Secretary-General, with the plans to issue a technical assistance on the application of the recommendations of the study on the subject for the guidance of Member Governments.

(1) That the attention of all Member Governments be drawn to the importance of annual estimates of the volume and structure of capital formation.

(2) That Member Governments at present preparing or planning to prepare statistics of capital formation should, with the Statistical Office of the United Nations with a view to improving their comparability with those of other countries.
Technical Appendix
DEFINITION AND MEASUREMENT OF CAPITAL FORMATION

I. Introduction

1. Statistics of capital formation have been found useful for various purposes of economic analysis but until recently few countries have been able to prepare reasonably accurate estimates over a sufficiently long period of time. Interest in the subject was stimulated very much in the latter part of the nineteen-twenties in connexion with the study and the analysis of the problems of the business cycle. At an early stage it was found that capital formation is one of the economic variables which fluctuate very heavily in the course of a business cycle. In several theories which were developed in attempts to explain the cyclical movements in economic conditions, the fluctuations in capital formation and saving also in relationship to the fluctuations in consumers' expenditure and other economic variables play an important role.\(^1\) Soon the need became felt to verify the so-called business cycle theories, which often left important questions unanswered, on the basis of factual information. This necessarily required the preparation of extensive statistics of all kinds, including estimates of national income, capital formation and other components of the national expenditure. At that time, however, progress in the preparation of these estimates could be modest only, due to the absence in many countries of a well-integrated system of basic economic and financial statistics from which the figures must be derived.

2. In the nineteen-thirties estimates of capital formation became instrumental in the formulation of policies aimed at greater economic stability and at combating unemployment. Certain of the measures proposed at that time were directly aimed at maintaining a greater stability of total public and private capital formation at a sufficiently high level. In the post-war period the maintenance of full employment has become an important issue and various measures have been proposed with this objective in view. The formulation of these policies

\(^1\) Cf. for a discussion of these theories G. Haberler, Prosperity and Depression, Third Edition, Geneva 1941, Chapter 3 "The Over-investment Theories," pp. 29-105.

/requires
requires a very detailed body of statistical data, including statistics of national income, public and private capital formation and other components of the national expenditure. For the analysis of current economic trends recent statistics of this type are likewise indispensable.

3. For the study of problems of economic development estimates of capital formation are also extremely useful. Increases in the low levels of productivity and real per capita income in the under-developed countries are possible only through technological progress and capital formation. Therefore, estimates of changes in real income and total capital formation are particularly important. The overall effects of a programme of economic development can be properly understood only on the basis of these estimates, which provide a measure of the total available resources of a country and of the part devoted to economic development. The estimates are also useful in connexion with the study of problems of financing economic development. The formulation of anti-inflationary policies, for example through proper fiscal measures including improved methods of taxation, is possible only on the basis of information on the size and distribution of the national income, estimates of public and private saving by main sources, etc.

4. There are different approaches to measuring the total amount of capital formation. In the nineteen-thirties attempts were often made to measure capital formation by ascertaining the total amount of funds seeking investment through the intermediery of the capital market and financial institutions such as banks, life insurance companies, building societies, etc. The necessary basic figures are derived from statistics of new issues of stocks and bonds, of mortgage loans and bank advances, and other financial statistics. As these statistics measure the flows of funds at various intermediary stages between the original source and their ultimate destination, overlapping and duplication cannot always be avoided. The figures would not include funds available for investment but not passing through the capital market, such as payments out of own means for consumers' capital goods, and the funds withdrawn for investment in own enterprises. These two items are in most countries difficult to measure with the exception of undistributed profits of corporations for which data are usually obtainable on the basis of corporate income tax statistics or surveys of profit-and-loss accounts.

/5. In recent
5. In recent years interest in the various methods for measuring capital formation has shifted to the so-called "physical" approach to which attention was drawn already in the report of the League of Nations Committee of Statistical Experts. According to this method total expenditure on various groups of capital goods is estimated on the basis of statistics of production, imports of capital goods, statistics of building operations, of stocks of producers and distributors, etc., through questionnaires addressed to the enterprises in which the new investment takes place, or through other methods. An advantage of the "physical" approach is that it permits a classification of total capital formation by major types of capital goods, thus greatly increasing its usefulness for purposes of economic analysis.

6. This study deals mainly with the "physical" approach to the measurement of capital formation. For many purposes of economic analysis estimates of the funds available for financing capital formation classified by the sectors in which the saving originates - individual and unincorporate business enterprises, private non-profit institutions, corporations, pension funds and other collective providers, and public authorities - are equally useful. If the various items are consistently defined and the available statistics properly adjusted, the total obtained should be equal apart from errors of estimation. The logical relationships between saving and investment may be studied on the basis of a system of social accounts. The following account brings together on the receipts side the various forms of saving arising in the economy, whether as a transfer to free reserves or as a net transfer to other reserves, and shows how this total is used to finance net capital formation - i.e., gross capital formation less allowances for depreciation and obsolescence - and net lending to the "rest of the world."}


Saving:
(a) Individuals
   (i) direct
   (ii) via insurance and private pension funds
(b) Enterprises
   (i) unincorporated
   (ii) corporations
(c) Public authorities, including social security funds

Net capital formation:
(a) Enterprises
   (i) agriculture
   (ii) mining
   (iii) manufacturing, etc.
(b) Public authorities
(c) Residential building

Net lending to the "rest of the world"

Total saving

The fundamental identity of saving and net capital formation plus net lending to the rest of the world holds for the economy as a whole, not for separate sectors. For example, saving of individuals may be used to purchase new as well as existing "real" assets and for making loans to other sectors. For a closed economy the balance of all lending and all increases in indebtedness is necessarily equal to zero; for an open economy it is equal to the sum of all net lending to foreign countries.

II. Basic Definitions
7. All goods produced to be used up in future productive processes - tools, machinery, plants and equipment, and producers' stocks of semi-finished goods - are called capital goods. Capital goods are not available for the immediate satisfaction of consumers' wants but are produced to facilitate the future production of goods. That part of a country's national output which is set aside as additions to its stock of capital goods is called capital formation. Gross capital formation indicates all output of capital goods in a given year, including all net additions to stocks. Net capital formation is obtained after an adjustment is made for depreciation and other allowances for capital used up in the productive processes of the year under review.

The services of fixed capital are usually spread out over a period of time until it wears out and becomes obsolete. Therefore, only a part of its value will be recovered by selling a unit of the product on which it is used.
Circulating capital, on the contrary, gives up its economic services at once.

1/ Often it may not be possible to separate the profits withheld in unincorporated enterprises from the saving out of personal income of independent entrepreneurs included under (a)(i).

2/ Classification by branches of economic activity in which the capital goods are installed.

3/ General government administration only. Public enterprises have been classified according to the industry where they belong.
Its value is fully recovered by selling the single unit of the product on which it is used.

8. As land is also used as an aid in the process of production, there is in many respects no significant difference between land and capital goods. However, economists in general prefer to treat land as a separate factor of production mainly because the conditions that determine the supply of land are very different from those determining the supply of capital goods. Land in this sense means not only the powers of the soil used in agriculture and forestry, its site value for roads, etc., and the location of public and private buildings, but also all natural resources, such as the sub-soil stock of minerals, the fish in the sea, the use of oceans and rivers for navigation, etc. Therefore land may be defined as natural resources created without the assistance of labour. All man-made improvements, installations and structures are treated as capital and should be included in the estimates of capital formation.

For the country as a whole all purchases of land would be offset by sales (apart from transactions with non-residents). But if a distinction is made between sectors of the economy, for instance, between public and private capital formation, the question arises as to how purchases and sales of land are to be treated. Consistency requires the elimination of the site-values of the land excluding man-made improvements, from the estimates of capital formation by sectors. For practical reasons it is extremely difficult in the case of agricultural land and of structures and land combined to divide the total value among the two components indicated. Therefore, estimates of public and private capital formation will usually include newly produced goods as well as outlay on existing real assets including the value of the land. Sales of real assets including land from one sector to the other will be treated as negative capital formation.

In transactions with non-residents land will have to be treated as other real assets and financial claims.

9. In this report the term investment - in accordance with generally adopted practice - is used to indicate the process of spending money capital for the purpose of hiring or purchasing capital goods. In a wider sense it is also used to indicate the acquisition of securities and financial claims, loans and advances, etc. Thus the term net foreign investment is often used as synonymous with net /lending
lending to the rest of the world. Net foreign investment includes the acquisition by residents of assets abroad, purchases of securities issued by foreign corporations, loans and advances to non-residents, as well as purchases of domestic assets and securities from foreign owners, and redemptions of loans due abroad. All these items are taken net of similar transactions by non-residents in the reverse direction. Net increases in the stock of monetary gold are now also usually included among net foreign investment as gold has some characteristics in common with financial claims upon foreign countries.

10. The terms gross and net capital formation in accordance with common practice indicate domestic capital formation, i.e., all additions to the stock of capital goods situated in the territory of the country concerned irrespective of the nationality of the individuals or companies who own these assets or who have financed their purchase. The territory is defined by a country's political boundaries. For the purposes of national income analysis overseas territories and dependencies are usually not included but are treated as foreign countries. The national territory includes all ships and aircraft under the national flag, embassies and consular offices abroad, and excludes foreign ships and aircraft in or above the national territory, foreign embassies and consular offices and international organizations situated in the country. A problem may arise with respect to the treatment of ships which, although owned by residents, are registered under a foreign flag or in one of the overseas dependencies. In such cases certain ad hoc decisions will have to be made by the responsible statisticians to bring the estimates as much as possible into line with treatment of corresponding items in the majority of the countries.\footnote{Another example is the treatment of the British oil companies operating in the Middle East in the official estimates of the United Kingdom. In the British White Papers on National Income and Expenditure the territory of these oil companies are considered as part of domestic capital formation and the income of the British employees is treated as part of the national income of the United Kingdom.}

11. The concept of a resident as used in preparing estimates of capital formation is the same as that underlying the estimates of national income and expenditure. The country of normal residence is the determining criterion. Thus, permanent residents temporarily abroad including workers temporarily abroad or employed across the border are considered as residents for the purpose of measuring national income and expenditure, including saving and capital formation. Business enterprises and non-profit organizations are considered residents of the country in which they are incorporated or registered. In the case of corporations...
operating in overseas territories the location of the head office may have been designated as being in the metropolitan area or in the Non-Self-Governing Territory. This may affect the treatment of saving in the form of undistributed profits of corporations, which may be excluded if the company is located abroad, but will probably be included if the company's head office is located in the country concerned.

Nationals employed in overseas territories may be treated as residents of those territories or as residents of the home country. Length of service abroad should be the determining factor but actually practices appear to differ. The method adopted affects the treatment of the increase in assets of the pension funds for these employees which are usually located in the metropolitan country. If employees abroad are considered as non-residents net remittances to the pension funds are a form of investment by foreigners balanced by an increase in the liabilities of the pension funds for future obligations. It is only in the year when the employees repatriate and become residents of the home country that the assets held against future liabilities can be included in the net national wealth. If the employees have always been considered as residents their net remittances to the home country must be included in the net foreign investment of the home country in the year when the payments are made.

The simplest way probably to treat employees of international organizations is to consider them as residents of the countries where the organizations are located.

III. Definitions of the empirical equivalents

12. As is often the case in national income analysis, attempts to define the empirical equivalents of economic concepts bring to light unforeseen complications and borderline cases which must be decided on the basis of expediency for purposes of economic analysis or by simple convention. It is obvious, therefore, that in such cases different answers may be possible depending on the purpose for which the figures will be used. Under these circumstances, it may be suggested that the estimates are published in sufficient detail to enable readers to treat the items concerned in different ways.

13. For purposes of statistical evaluation capital formation may be defined as
consisting of expenditure on producers' durable goods, such as durable equipment and non-residential construction and changes in business inventories. Usually residential building is also included. Although houses render services to consumers and not to producers and therefore should be regarded as consumers' durable goods they have several characteristics in common with capital goods. The expected lifetime is usually considerable and the owners are able to derive an income from the renting of the services that houses provide after allowing for maintenance and repairs and other expenses. Therefore, houses are usually classified together with capital goods for the purpose of measuring capital formation. Practices differ with respect to certain other durable consumers' goods, such as private automobiles, refrigerators, washing machines, etc. As a rule, such durable goods are not classified as capital goods, unless when forming a permanent part of residential structures such as apartment buildings or belonging to the inventories of commercial buildings. The criterion is whether the goods are owned as part of a business enterprise and therefore may be expected to yield a return. In all other cases, constituting the great majority of purchases of durable consumers' goods, they are generally treated as a component of consumers' expenditure on goods and services or of government current expenditure on goods and services and excluded from the estimates of capital formation.1/ 14. Considering all expenditure on consumers' durable goods as a component of capital formation might have certain advantages. It would make it possible to distinguish between consumers' expenditure on durable goods and the services derived by consumers from the stocks of durable goods in their possession. This could, at least in principle, lead to a more accurate evaluation of the actual consumption of durable goods in times when purchases decline rapidly as happens for example during a war. The reason that such an analysis has seldom if ever been made is that too little is known about consumers' stocks of durable goods and their depreciation rates of which consumers usually do not keep accounts. Treating outlay on durable goods as a component of consumption expenditure leads to a logical difficulty, of very minor significance only, in those cases where consumers later sell these goods to a business enterprise. For example, a used automobile bought by a business enterprise from a private person not for resale

1/ However, in Australia purchases of private automobiles are treated as capital expenditure.
to other consumers must be treated as capital expenditure. From the standpoint of the economy as a whole, the transaction is not offset by a negative capital outlay of the consumer since the automobile has not been regarded as a capital good before. The only practical way out seems to be to treat the sale by the consumer as negative consumption expenditure if the fundamental identity of net national product and net national expenditure is to be preserved. However, the solution may not always appear to be entirely acceptable.

15. Another group of conceptual problems arises when attempting to define the borderline between capital formation and current business expenses. According to a usual definition which will also be adopted in this report, a durable good is one having a life expectancy of two or more years. By "life expectancy" is meant the average life of a capital good when used in its original economic function. Sometimes the limit is set higher at three years and sometimes it is set at one year or even at six months. Practices differ. In the national income publications of many countries reference is made to the usual methods of business accounting and no specific lifetime is adopted as a criterion. In general it may be suggested that in this, as in other similar questions, the national income statistician should not deviate unnecessarily from the usual methods of business accounting in the country concerned.

If a life expectancy of two years is adopted as the limit then obviously all outlay on goods with a lifetime of less than two years must be classified as current business cost. Whether the limit is two years or more will affect the figures found both for gross national product and for net national product. As all goods with a lifetime of less than a year must be written off within twelve months, a decision to classify them as outlay on capital goods instead of as current business cost would still affect the figures found for gross national product and gross capital formation, but not the figures for net national product (or very slightly only). In some countries the concept of capital formation is widened to include all repairs and maintenance with the exception of daily care and supervision.\(^1\) If this is done the figures obtained for gross capital formation

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\(^1\) In Norway this broader concept has been adopted on the theoretical ground that the total of the depreciation allowances for wear and tear and the costs of maintenance and repairs is more meaningful for purposes of economic analysis. If in certain years, for instance during and immediately after a war, maintenance and repairs fall behind, the allowances for wear and tear will increase. There are also statistical reasons for adopting the wider concept. Cf. Section V.
will not be comparable with those of other countries. However, the estimates obtained for net national product and net capital formation would hardly be affected.

16. Certain durable goods of a very complicated structure may well have parts with an expected duration of life much less than the two years proposed as a limit for defining the borderline between capital expenditure and current business cost. In such cases it is neither practicable nor customary to attempt to divide the goods concerned into durable and non-durable parts. But replacement of the non-durable parts would have to be treated as a current business cost and not as a component of gross capital formation.

17. Additions, renovations and remodeling will in general have to be treated as new capital formation. If, and to what extent, minor alterations ought to be included depends on the expected lifetime adopted as a criterion for defining capital goods. In those countries where the concept of capital formation has been widened to include all repairs and maintenance, minor alterations of all sorts would also be included.

18. Capital formation should be valued at the full cost to the entrepreneur in whose hands the decision for the investment lies, and in whose plant the newly produced assets will be installed. Therefore, capital expenditure includes the producers' or distributors' sales price of the capital goods plus all transportation, installation and distribution charges including customs and other indirect taxes, as well as all outlay incurred in connexion with the preparation of the project, such as fees to architects, engineers and lawyers, etc. Bankers' and underwriters' commissions and fees and other costs incurred in connexion with the floating of the issues from which the new investments are financed should also be included. Capital expenditure on residential and commercial buildings should not include the price of the land on which the structure will be erected. It should include such items as architects' fees, the cost of preparing the building lot and of landscaping, real estate dealers' commissions, legal fees, registration costs, etc. Capital gains and losses made by investors ought to be excluded from the estimates of capital formation. In practice, it is not always easy to indicate precisely which part of the profits made in certain branches represents a capital gain. For instance, the decision to build residential structures with the expectation of selling them at a profit may contain a speculative element which is part of the regular activities of the building trade.
In such cases it may be difficult and even not useful for purposes of economic analysis to try to separate the element of capital gain (or loss) included in the profit figures. A practical solution might be to consider such speculative profits not as capital gains when they are realized within a relatively brief period of time, for example within six months after completion of the building.

19. It is difficult to determine how legal fees, dealers' commissions and brokerage fees on the transfer of real estate and other existing real assets ought to be treated. To the buyer they represent part of the cost of his investment and therefore they should be included in the estimates of capital expenditure. On the other hand, it is likely that in many cases at least part of those costs have to be written off almost immediately after the transaction has taken place. To that extent they may have to be regarded as a kind of business cost to be deducted from the expected actual or imputed return on the investment.

20. Net additions to the inventories held by producers and distributors are difficult to measure because of lack of basic data and the difficulties experienced in making necessary adjustments. Available sources for non-agricultural enterprises usually give the book value of the inventories at a certain date. These figures generally require complicated valuation adjustments to eliminate capital gains and losses resulting from price fluctuations before they can be used to estimate net investment in inventories. Inventories are usually valued at historical cost or at market prices, whichever is lower. For those commodities for which the inventory turnover period is short, the book value of inventories cannot differ very much from their market value. With rising prices book values may tend to lag behind market values and in times of rapidly declining prices they may fall below original cost. When in valuing the inventories at historical cost the first-in-first-out method is used, differences between book-values and market values will tend to be less than when the last-in-first-out method had been used.\[1/\]

21. When inventory turnover is rapid, when it may be assumed that price movements and changes in inventories have been gradual, and when no great precision is required, book value figures may be adjusted for price changes with the help of certain general price indexes for the groups of commodities concerned. More accurate estimates require detailed information on quantity changes in stocks and market prices, plus costs of storage and other expenses. If it may be assumed that changes in stocks have been very gradual, the net investment in inventories may be estimated by multiplying the increase in quantities by the average price.

\[1/\] In the United States the use of the last-in-first-out method seems to have become more common in recent years.
during the period considered. For agriculture figures on inventories, including livestock, are available in a number of countries. Because of marked seasonal fluctuations in additions to and withdrawals from stocks it would often not be permissible simply to multiply the increases in the quantity figures by the unweighted average prices during the year to which the figures refer. What has been said about changes in stocks applies also to increases of work in progress except that the valuation problem may be more difficult owing to the difficulty of establishing appropriate price indexes for the particular industries concerned (chiefly shipbuilding, certain branches of the metal industry, construction activity, etc.).

22. It is customary to evaluate separately public and private capital formation although for statistical reasons it is sometimes not possible to make the distinction or to prepare estimates of both components. ¹/ For those countries for which separate estimates of public capital formation exist the concepts used appear to differ considerably. The purpose of this and the following paragraphs is to review the major conceptual differences and to formulate proposals which, it is hoped, may result in greater international comparability in this particular field. It is felt that the proposals would help to meet the requirements of economic analysis without entailing too serious difficulties from the point of view of the usual methods of government accounting.

In studies of national income and capital formation all public authorities as a rule are treated as one sector of the economy. Accordingly, public capital formation refers to the central, state, provincial and local governments combined.

23. In general, government capital expenditure would include items such as the following:

(a) Investment in newly produced and existing real assets on behalf of
   (i) general government administration, education, defense, etc.
   (ii) government-owned enterprises.

(b) Purchase of existing securities, other net increases in financial claims, net lending plus all other decreases in net indebtedness.

For the purpose of estimating public capital formation, item (a) should

¹/ In the United States only estimates of total private capital formation, excluding all investment in government enterprises, are published. The series shown for government expenditure on goods and services includes all current expenditure on goods and services plus all capital outlays including investment by government enterprises. It is stated that aside from some difficulties in defining government capital, the available statistical sources did not permit adequately to distinguish capital outlays from current government expenditures for goods and services. Cf. "National Income and Product Statistics of the United States 1929-1946", Supplement to Survey of Current Business, July 1947, U.S. Dept. of Commerce, Washington D.C., page 5, note 2.
be restricted to outlay on newly produced assets only. If, for statistical reasons, it is not possible to distinguish between outlay on newly produced and on existing real assets, then net sales of existing real assets by the private sector should be considered as negative capital formation when defining private capital formation. It is, of course, not suggested that this rule be followed when an industry is nationalized or in similar special cases. When defined for the government sector as a whole, item (b) will represent the net increase of the government's financial claims upon the private sector and all foreign countries, as the balance of all lending and borrowing between public authorities must necessarily be equal to zero.

24. As a rule, estimates of public capital formation include also capital formation in government-owned enterprises. This is somewhat contrary to the general practice in national income analysis. For example, when defining the classification of national income by industrial origin, it is customary to classify publicly-owned enterprises according to the industries where they belong and to limit the government sector to general government administration, public education, defense, etc. This practice is usually not followed in statistical studies on capital formation, the reason being that the total of all government capital outlay on newly produced real assets whether for purposes of public administration or in government-owned enterprises, is probably the more significant concept for purposes of economic analysis, for instance when used for studies concerning the maintenance of economic stability. On the other hand, there are advantages in keeping the two items separate. For example, the distinction between revenue-producing investment - in the strictly financial sense - and non-revenue-producing investment corresponds roughly, but not always exactly, with the distinction between investment in public enterprises and investment for purposes of general government administration. This distinction may be useful, for example, for studies concerning public debt policies, when it is desirable to know the total outlay on revenue-producing assets as well as the expected return on these investments.

25. In cases where the government is not the sole owner of an enterprise, it is necessary to develop criteria indicating when an enterprise should be regarded as publicly-owned for the purpose of measuring public capital formation and when it should be treated as a private enterprise. It is conceivable in cases where the government is not the sole owner to treat total investment in those enterprises partly as public and partly as private capital formation on the basis
of the percentage of total paid-up capital held by the government and by private shareholders. In general, however, such a formula is too complicated for practical purposes. A simpler rule is to treat an enterprise as publicly-owned for the purpose of defining public capital formation when the government owns more than half of the shares outstanding.

26. In general, it is desirable to distinguish between public capital formation in general government administration and in government-owned enterprises. Government enterprises are defined according to the U.S. Department of Commerce "as those agencies of government bodies whose operating costs are at least to a substantial extent covered by the sale of goods and services, in contrast to the general activities of government which are financed by tax revenues and debt creation".\(^1\) In most cases the distinction can easily be made and the borderline cases are usually of minor importance only. The International Standard Industrial Classification of All Economic Activities states explicitly that general government services do not include "governmental activities, other than administrative, in such fields as transport, communication, education, health, production, marketing, and the operation of financial institutions, each of which, together with other similar activities, is classified in the appropriate industry group".\(^2\) As an example of borderline cases, the following may be mentioned. A government agency regulating the prices of certain commodities by paying out subsidies, imposing a levy on certain imports, etc. and whose administrative expenses are met by the industry concerned is likely to be classified under general government although under somewhat different conditions it would probably be treated as a governmental enterprise in certain countries. As another example, a social insurance agency may be mentioned whose administrative expenses are met out of premiums received from employers and/or employees. Something may


\(^2\) Cf. Statistical Papers, Series M. No. 4, Statistical Office of the United Nations, Lake Success, N. Y., 31 October 1949, page 11, paragraph 7b and page 28, Division B. In the International Standard Industrial Classification governmental and private educational institutions of all types form a separate "group" not included in Group 81 which refers only to administrative activities of the government in all levels. It is suggested here that for the purpose of measuring public capital formation investment in governmental educational institutions be grouped together with investment in general government administration.

\(\)be said
be said for classifying it under "insurance" instead of grouping it together with general government administration as appears to be the customary procedure in most countries.

27. For the purposes of national income analysis and the measurement of capital formation, house-ownership should be regarded as a form of business activity, to be added as a separate category to the International Standard Industrial Classification of All Economic Activities. If this is done, public ownership of revenue-producing real estate should also be regarded as a form of government enterprise. But public buildings, schools, parks, roads, bridges, canals, etc., will in general not be included in this category but be classified as durable goods in the sector of general government services, including public education.

28. In studies of national income and expenditure the general government - excluding government enterprises - is usually treated as a consumer of final goods and services "in the sense that the government is in almost all cases the last link in the chain of transactions short of the actual using up and wearing out". As a consequence, there is a certain similarity in the handling of the revenue and the capital accounts of persons and of "public collective providers". The separation of public capital formation from government current expenditure on goods and services, including payments to factors of production, offers no serious conceptual problems, except in the case of military expenditure which is discussed in some of the following paragraphs. The main problem is to decide for a number of borderline cases which items should be treated as current expenditure and which should be regarded as capital expenditure. In many cases no very detailed information on the way various items have been treated has been made public. It is known, however, that items such as repairs and minor alterations of roads, public buildings and schools are sometimes treated as current expenditure, for example in cases where this task is undertaken by a regular staff of government employees instead of by private firms. The government's overhead cost of planning and administering the construction of public buildings, etc., is generally not included in the value of the projects and the estimates of public capital formation.

29. How the outlay on office furniture and equipment has been treated in the various countries is usually not disclosed. Outlay on the heavier types

1/ Cf. Group 630 of the International Standard Industrial Classification.

of office machines, etc., is likely to be treated as capital expenditure. If the analogy with the private consumers sector should be pursued closely, it may be suggested that outlay on office furniture and supplies be treated as current expenditure, and that increases in government stocks of these durable goods be excluded from the estimates of public capital formation.

30. Government grants made under very special circumstances, such as land drainage payments in times of war, or subsidies to the shipbuilding industry during a depression, are not part of public asset formation, but the corresponding real investment will appear as private capital formation.

31. The treatment of military expenditure gives rise to important and complicated conceptual problems. The solution to be adopted may have a considerable effect upon the totals found for the national income and gross and net capital formation. In wartime the nature of these problems may change considerably as compared with peacetime. To the extent possible, the solution adopted for defining a peacetime and a wartime concept should be based on similar principles.

A solution has been suggested along the following lines. As the purpose of economic activity is to produce goods to satisfy ultimate consumers, net national product includes the gross value of consumer goods flowing to individuals and households plus net additions to the stock of capital goods, since only a net increase can augment the future supply of consumer goods. Given consumer satisfaction as the primary purpose, war production may be treated as an item similar to capital formation in that it serves either to maintain or increase the flow of consumer goods in the future. War production may be viewed more or less as similar to those types of capital formation designed to avoid or mitigate the effects of calamities that threaten the productive fabric of a country. If this principle is adopted, net national product should include only that unexpended part of total war output as is the net addition to the inventory of war goods.

In statistical practice, this means subtracting from the gross value of war output in any given year the current consumption and obsolescence of war goods.

32. In the wartime concept of national product, according to Professor Kuznets,

1/ The following paragraphs summarize some of the views expressed by Professor S. Kuznets, National Product in Wartime, National Bureau of Economic Research, New York, 1945, pages 7 seq. Reference is made to Part I of this volume for a more detailed discussion of the conceptual problems involved in the treatment of war output in national income analysis.

2/ S. Kuznets, loc. cit. page 8.
the aims of the armed conflict may be considered as being on a par with the satisfaction of consumer wants, and therefore a final purpose.\footnote{1} All finished war goods ready for use in armed conflict are then final goods. Hence, the corresponding net national product includes all finished war goods, durable and non-durable, as well as net additions to the inventory of unfinished war goods and to the stock of war plants. The corresponding gross national product is, in addition, gross of the current consumption of war plants.

33. The method explained in the previous paragraph has not often been used in statistical practice. The more usual approach which more or less avoids attributing meaning to war output in terms of a peacetime concept of national concept of national income, is along the following lines.\footnote{2} Regardless of what war production means in terms of purpose, it represents an input of scarce resources of the type utilized in peacetime to turn out economic goods. Many of the resource units are identical: in the year preceding war they go into finished consumer goods or contribute to the accumulation of peacetime capital equipment; and in the years of war they are diverted to the production of munitions war construction or service in the armed conflict proper. Therefore, without analyzing in detail the ends war production is meant to serve, it may be measured as a component of gross or net national product on the basis of input of resources. In accordance with this viewpoint investment in war plants which is useful also for peacetime purposes, should be treated as capital formation, and all other military expenditure, including outlay on various types of durable munitions, as current expenditure on goods and services.\footnote{3} It is clear that this method


\footnote{3} As an example of a different treatment it may be mentioned that in the earlier post-war estimates for France all outlay on durable military equipment and increases in stocks of military supplies were treated as capital expenditure.
comes closer to Professor Kuznets' wartime concept of national product. When all outlay on stocks is treated as current expenditure a difficulty arises when surplus war stores are sold at a later date. In the Report of the League of Nations Sub-Committee on National Income Statistics, it is suggested to enter such expenditure as capital formation at the value which it fetches on sale. The situation is similar to that of an individual selling a durable good to a business enterprise.

34. The net foreign investment component of total capital formation consists of all increases in real assets held abroad and financial claims upon foreign countries which originate in excess of exports of goods and services over imports. Inheritances and gifts received from abroad and capital transfers accompanying immigrants although adding to the national wealth, do not form part of the net foreign investment component, as by definition capital formation refers only to items originating from the total national output of goods and services. In those cases where exports and imports are recorded on a cash basis, as distinct from shipments and arrivals, an adjustment may be necessary for changes in the amount of short-term trade credit outstanding.

35. Gold has the property of being both a source of foreign exchange and a commodity. As a result, gold can be treated in the national expenditure account either as a claim on foreign goods and services and therefore as an entry in the foreign capital account or as a durable commodity and therefore as an entry in the domestic capital account. Total capital formation is the same, whether a change in the stock of gold appears as domestic or as foreign investment. At least three methods of handling gold in the foreign and domestic capital account may be distinguished:

(a) The traditional method considers only international gold movements which supplement capital movements in balancing reverse flows of goods and services. Thus, assuming no other capital movements, a deficit on current account resulting from an excess of commodity imports over commodity exports is balanced by an export of gold.

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1/ Cf. paragraph 31.
2/ Measurement of National Income and the Construction of Social Accounts, page 77. In the United Kingdom increases in the value of inventories are treated as capital formation and sales of surplus stores as disinvestment.
3/ Such an adjustment has been made in the accounts for the United Kingdom. Cf. National Income and Expenditure of the United Kingdom 1946 to 1948, Cmd. 7649, page 52, note to item 47.
Since the gold is a balancing item, this would be considered as a decline in a country’s foreign reserve position and the loss of gold would appear in the capital account as a decrease in foreign investment.

(b) According to the method proposed in the Report of the League of Nations Sub-Committee on National Income Statistics gold is considered a commodity like any other durable commodity. The method has in common with the traditional method the fact that gold is entered in the international accounts only when it is imported or exported. However, in the case just mentioned, the Sub-Committee’s method would include the export of gold in the foreign current account rather than the foreign capital account. The algebraic sum of the international transactions is still zero, but the loss of gold is considered the same as a decline in domestic investment due to exports out of domestic inventories of any other durable commodity and not as a decline in foreign investment.

(c) Both the traditional method and the method of the League of Nations Sub-Committee on National Income Statistics fail to make a distinction between a loss of gold out of gold reserves and exports of gold out of current production and consequently do not provide a close estimate of the current balance of payments position. In both methods, a commodity deficit excluding gold met by the United Kingdom out of gold reserves would appear exactly as would a commodity deficit excluding gold met by the Union of South Africa out of current gold production. To meet this objection, the International Monetary Fund introduces gold production into the foreign accounts. The net change in monetary gold stocks is included as foreign investment or disinvestment in the capital account, while in the current account current gold production is included as a credit item, just as is the creation of any other current claim on foreign goods and services. As a consequence, all domestic transactions in gold between the monetary authorities and the private sector appear in the balance of payments.

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1/ This method was used in the series of annual volumes Balance of Payments published by the League of Nations. See also Measurement of National Income and the Construction of Social Accounts, page 67.

with the result that a sale of gold by the Central Bank to industrial users is considered as much a decrease in foreign investment as is a loss of gold abroad, since in either case the effect is a reduction in claims on foreign goods and services. In the other two methods, domestic gold production is treated as domestic investment until exported so that domestic transactions between the monetary authorities and the private sector do not affect the foreign account.

36. The following items are in general not included in the estimates of capital formation:

(a) Consumers' stocks of durable and non-durable commodities
(b) Inventories of museums, works of art, and various collectors' items
(c) Discoveries of sub-soil resources
(d) Additions to national territory by treaty, etc.
(e) Increase in technical skill and knowledge of the population.

Item (a) is usually excluded because of the difficulty in obtaining statistical information, item (b) because of the valuation problem and items (c) and (d) because they do not originate in the total national product. Item (e) is undoubtedly of the greatest importance as a determinant of future total output. However, it would be extremely difficult to attempt to value it in economic terms. For purposes of economic analysis, it is usually not necessary to include the item.

IV. Capital consumption allowances

37. To obtain figures of net capital formation, the estimates of gross capital formation have to be adjusted for the consumption of capital in the form of normal wear and tear, including obsolescence. Sometimes accidental damages to fixed capital are also regarded as an element of capital consumption.

Capital consumption is very difficult to define accurately and still more difficult to estimate. Theoretically, "(it) is measured by the reduction in the aggregate discounted value of the prospective stream of services which would occur in any given time period irrespective of changes in expected interest rates and prices and irrespective of windfall losses or gains of an extraordinary character". 1 It is generally agreed that this is not a very precise definition.

let alone a concept susceptible to statistical measurement, and therefore some rough attempt is usually made to use instead estimated depreciation allowances at replacement cost. For the purpose of this report, it is not necessary to go into the various arguments used among business accountants in the controversy about depreciation allowances at replacement cost. Some of the points relevant for the analysis of national income and capital formation may be summarized as follows: 1/

38. Allowances for depreciation and obsolescence are set aside to provide a fund which will enable the equipment to be replaced by the time it is worn out or obsolescent. The basis of valuation of these allowances depends on the meaning attached to maintaining capital intact. If one is concerned with money capital, it is sufficient to set aside each year sums which are expected to add up to the original value of the equipment by the time the equipment is worn out or obsolete, since, in this way, the enterprise is always able to repay its original debt. On the other hand, it is sometimes thought that the maintenance of so-called real capital is the more important concept. From the point of view of the economy as a whole, it is the maintenance of real rather than money capital that seems most relevant. It is not, however, the concept approximated in either business accounts or tax assessments in which interest usually centres on money capital. Obviously, in national income statistics an estimate which allows for capital consumption on the basis of an estimate of depreciation at replacement cost is likely to approach more closely the basic definition of national income, than one which allows only for the recovery of the original money capital invested in fixed assets.

39. In principle, two problems have to be investigated - how to ascertain the basic depreciation rates used in various industries for various types of assets and how to establish the price indices which enable to convert depreciation allowances at original cost to a replacement cost basis. With respect to a replacement cost basis, With respect to the first point, it may be stated that the number of years over which a depreciation allowance can be spread is never known exactly, as there is never any certainty about the exact date of replacement of equipment. Moreover, technology does not stand still and as a

result replacement of equipment is very rarely made with identical machinery, but with machinery which for some reason or other has advantages over the previous equipment.\(^1\) This point is particularly important with respect to the second question raised, since price indices to be used for the transformation of depreciation allowances from original cost to replacement values should necessarily refer to goods of constant "quality".

40. Any attempt to carry out precise adjustments of the type indicated would require detailed information on the age distribution and the rates of depreciation of various types of real assets combined with suitable group indices of prices. Attempts to carry out the computations in such detail have rarely been made. Information on depreciation rates is in general difficult to obtain. Results of direct observations as published in the technical literature from time to time, for example in the form of life tables for various types of durable goods, may be useful. In most cases the rates commonly used by business enterprises will have to be accepted. If possible, they should be compared with the depreciation rates approved by the income tax authorities. Too little is known also about the pattern of the depreciation rates over time. In many cases a simple straight-line relationship is accepted, but there are cases where a curvilinear relationship, for example depreciation at decreasing rates, is known to correspond more closely to reality. The problems in this field are still largely unexplored. There is undoubtedly a great need for the collection of more factual information on the depreciation rates actually used in business enterprises before the problem of estimating capital consumption allowances can be put on a firmer footing.\(^2\)

41. Some countries, and particularly Sweden, are so impressed by the difficulty and arbitrariness of estimating depreciation that estimates are made only of gross capital formation and gross national product. For other countries, for example Canada and the United States, the estimates are based on accounting figures taken from balance sheets without adjustment to a single concept of either replacement...

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\(^1\) Cf. for this and previous statements A. R. Prest, l.c., page 397.

\(^2\) This is also the conclusion of Raymond W. Goldsmith, A Perpetual Inventory of National Wealth, page 17, Conference on Research in Income and Wealth, April 1950, National Bureau of Economic Research, Inc., New York.
cost or original cost, either of which may be used by business enterprises.\(^1\)

Any estimate of national income in which allowances are only made for
maintaining original money capital intact is obviously biased upwards in a period
of rising prices and biased downwards when prices are falling. Although any
corrections to be made on this account might not in normal times be very
significant, in a period of rapidly rising or rapidly falling prices the bias
introduced may be of some importance.\(^2\)

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\(^1\) The estimates used in the national income studies of the United States
represent the depreciation charges reported by private business, including
depreciation charges against owner-occupied houses. They are not adjusted
for changes in the replacement value of capital goods, except for farm

\(^2\) Cf. A. R. Prest, loc. cit., page 387. In this connection the author refers
also to various attempts that have been made to adjust the official estimates
of the United Kingdom on this point, for example, A. R. Prest, "National
Income of the United Kingdom, 1870-1946," Economic Journal, March 1948,
and D. Sears, Oxford Bulletin of Statistics, October 1948. Mr. Prest concludes
on the basis of the tentative estimates that the correction to be made to the
official figures was of the order of £250/300 million in 1945/46, that is an
addition of about 35 per cent to depreciation allowances and a deduction of
about 3 per cent from the national income. It is impossible to extend the
technique of estimation to more recent years owing to the introduction of
special initial allowances in 1946. As an inducement to investment the
present tax law permits a 40 per cent initial depreciation allowance in the
first year of a new investment. For subsequent years, depreciation is
calculated on the remainder of the investment on an original cost basis.
For purposes of national income measurement, the provisions of the tax law
with respect to depreciation allowances present serious problems. The first
is that depreciation, if taken directly from Internal Revenue sources, will
increase sharply with a sharp increase in new investment. Secondly, a change
in the legal allowances for depreciation, such as occurred between 1943 and
1949 introduces an arbitrary element in the calculation of national income and
net capital formation. These difficulties can be overcome only by making
direct estimates of capital consumption, for which, it is stated, information
is not available.
42. In Denmark an attempt has been made to estimate depreciation allowances at a replacement cost basis taking into account also that capital consumption is a function not only of time but also of the use made of the capital goods as measured by total output in any given unit of time. The assumption has been made that for each branch of economic activity depreciation at a replacement cost basis bears a constant percentage relationship to the gross value of output. This relationship has been established as follows. Depreciation allowances such as those recognized by the tax authorities are usually expressed as a percentage of the purchase price of the capital goods concerned. Therefore, the problem is how to determine the absolute amount of the depreciation allowances at replacement cost for a certain base year or base period. This has been done by trying to establish what the relationship has been, in a "normal year", between the total amount of depreciation and the gross value of output, the latter measured at factor cost to eliminate what are believed to be arbitrary effects of changes in indirect taxes. The assumption has been made that for a "normal year", i.e. a year corresponding roughly to the average over an entire business cycle, depreciation at original cost as an absolute amount should be equal to depreciation at replacement cost. It is stated that the assumptions made and the method followed should be regarded as a very tentative procedure subject to further improvement. In certain other countries where attempts have been made to estimate depreciation at replacement cost taking into account that capital consumption is a function also of output, the methods followed are likewise also very tentative. The problem requires further examination, also in certain of its theoretical aspects.

43. In some industries the practice exists, and it is sometimes recognized by the income tax laws, of writing off all replacements, additions and new investments in the year in which the capital outlay is made. Such a procedure obviously leads to an underestimation of net capital formation in the year when the investment is made and to an overestimation in subsequent years unless compensated by similar biases of the same magnitude in the opposite direction which in general are unlikely to occur.


2/ Sometimes instead of using a precise functional relationship the empirical fact is taken into account that entrepreneurs often tend to increase depreciation allowances in boom periods over and above what is allowed by the taxation authorities, or what would be justified on a historical cost straight-line basis (cf. A. R. Prest, loc. cit. page 396).
In some countries, and particularly in those affected by the war, capital equipment has sometimes been used over a period far exceeding the lifetime expected when the original depreciation allowances were set. It is not customary in such cases to revise depreciation allowances for previous years retrospectively, but when a capital good is still being used it is necessary to make an allowance for depreciation even if it has been entirely written off in previous years.

Allowances for depletion of natural resources are not treated as part of capital consumption because the value of new discoveries of such resources is not counted as part of gross capital formation.1/ 

44. Capital consumption allowances include certain items which are usually charged to current expense by business enterprises instead of being entered on capital account and depreciated. The item is largely determined by the definition adopted in measuring capital formation. The wider this concept with respect to the inclusion of items usually classified as current business costs, the more important capital expenditures of this type will be. The item usually includes the purchase of small capital goods and certain repairs and maintenance expenses. Expenditures for development and drilling of oil and gas wells, although usually treated as a current business expense, should be considered as capital formation and at the same time be included among capital consumption.

45. Extraordinary destruction of capital caused, for instance, by earthquakes, floods, storms and other natural calamities, acts of war, accidents, fires and similar catastrophes is in general not regarded as capital consumption for the purpose of estimating net capital formation, but treated as a capital loss. However, such losses as are usually covered by business insurance are often treated as capital consumption. Because of a certain regularity in their occurrence, which may be more marked in large than in small countries, they may be considered as a form of capital consumption inherent in the organization and structure of society, and present technical knowledge as to how to prevent or combat them. In the United States all accidental damage to fixed capital measuring the value of the physical losses by fire, natural events, and other accidents to fixed capital of private business, not covered by depreciation


/charges,
charges, is treated as a component of capital consumption.\(^1\) In other countries only the insurable business risks are considered as such.\(^2\) As a consequence, net business insurance premiums are treated as a measure of these capital consumption allowances; i.e., the gross premiums less the amounts that may be considered as payment for the administrative services rendered by the insurance companies. By definition the net insurance premiums equal receipts by business enterprises in respect of claims for damage to fixed capital plus the increase in insurance reserves to meet future claims.

Losses through acts of war are usually treated as capital losses. To the extent that war risks are insurable, losses may be included among capital consumption. If this is done, the treatment of war risk insurance premiums will be similar to that of other business insurance premiums.

46. Depreciation of public buildings, roads and bridges, etc., is difficult to measure, because in many countries this item is not entered separately in the government accounts. Often, expenditure on new public buildings, schools, roads, etc., is not even included in the capital account, but treated as a current expenditure. In other countries, and especially in Sweden, such expenditure is included in the capital account, but is written off immediately by introducing an offsetting item in the current account. Obviously, in the year in which the investment is made, this procedure tends to overestimate the difference between gross and net capital formation.

In the United Kingdom capital consumption allowances in the local authorities sector, excluding government-owned enterprises, have been approximated by adding to the sums repaid to lenders and transferred to sinking funds, which have been treated as the equivalent of depreciation allowances, an estimate of sums provided for the maintenance of highways and bridges.

V. Methods of estimating capital formation

47. Estimates of capital formation may be obtained in a variety of ways. Which method should be used is determined largely by the kind of basic information

\(^1\) Cf. Supplement to Survey of Current Business, U.S. Department of Commerce, July 1947, page 10. In the United States accidental damage which can be repaired is excluded because such repairs are treated as current expense and not as investment. Damages to public roads and buildings are not included since the necessary repairs are treated as a current expense. Damage to inventories is also excluded since the change in business inventories, which is a component of gross national product or expenditure, is already net of such losses.

\(^2\) This is the method followed in the United Kingdom.
available from which the estimates must be derived. Although roughly three
groups of methods may be distinguished, it is not possible to indicate in detail
how these methods should be used as much will depend on the scope and coverage
of the primary statistical sources, the concepts and classifications used, the
completeness, accuracy and mutual consistency of the data, and the degree of
conformity to the definitions adopted as a basis for measuring capital formation.
The problems of estimation will also vary with the economic structure of the
country concerned. In the so-called underdeveloped countries with a large non-
monetary subsistence economy the techniques of collecting basic data are
necessarily very different from the methods used in highly developed countries.
Problems of classification, allocation and valuation also vary considerably. In
all these cases many questions of detail may arise for which special solutions
will have to be found.

The purpose of the following paragraphs is to explain briefly the three
principal groups of methods used for estimating capital formation, including
certain recommendations for the presentation of the results. For the reasons
indicated a complete discussion of the various problems of detail that may arise
is not practicable. To illustrate certain of the relevant points, references
to existing estimates have been included.

48. In some of the earlier studies of national income and expenditure estimates
of domestic capital formation have sometimes been obtained as a residual after
deducting from the total national income or product estimates of consumer
expenditure and government expenditure on current account, public capital
expenditure, and net foreign investment. As a result, the figures obtained for
domestic capital formation are peculiarly subject to error, as a consequence of
being affected by all the difficulties of statistical calculation of the other
components. In addition, the fact that it is a residual item also means that it
cannot be subdivided into any further components. The following paragraphs will
therefore deal only with direct methods of estimation.

49. The method very generally used for estimating capital formation is based on
the available statistics of production and imports of capital goods. Domestic
capital formation is estimated according to the formula:

\[ \text{Domestic capital formation} = \text{domestic production of capital goods} + \]
\[ \text{imports} - \text{exports} \]

For the purpose of estimating capital formation all items in this identity must
be valued
be valued at the total cost to the entrepreneur who makes the final investment. Accordingly, the figures for domestic output of capital goods and imports of capital goods ought to be adjusted for transportation and distribution costs, mark-ups for importers, fees paid to architects, engineers, legal advisors, etc. Because of unavoidable inaccuracies in the method of estimation, some countries state that they have ignored some of the smaller adjustments mentioned.

50. The main problems involved in the method are avoidance of duplication and allocation of final products by destination. For example, if import statistics are used to estimate total imports of capital goods, then it is necessary to indicate for each item in the foreign trade statistics whether it represents a capital good or not. Some commodities, for example automobiles, typewriters, garden tools, refrigerators, washing-machines, etc., may be used as capital goods in business enterprises or as final consumers' goods by persons. The same problem arises with respect to the domestic output of commodities of this kind. It is usually solved in a tentative way. For example, in the United States all portable typewriters are allocated to individual consumers whereas standard typewriters are allocated to business and government. Similarly, with respect to washing-machines, etc., all retail sales are allocated to final consumers and the remainder of total output is allocated to capital formation. In Norway, the allocation of private automobiles to consumers and business enterprises was possible on the basis of registration data, but in other countries a very rough percentage distribution between the two categories has been adopted.

51. A problem of allocation of a different kind arises with respect to such tools or parts as may enter into newly produced capital goods or may be used to replace parts of existing equipment. In the latter case the output of such parts is an element of gross capital formation. But those parts that enter into newly produced capital goods should not be counted twice. Thus the problem arises of how to allocate intermediate products and parts according to destination and to avoid duplication. The use of production statistics sometimes makes it difficult to determine exactly which goods are entering capital formation and which goods must be separated out as production for repairs and maintenance. In the Scandinavian countries the distinction between production for repair and production of new equipment was found very difficult to make. This is probably one of the major reasons that the definition of capital formation in these countries was widened to include all repairs.
52. For various purposes a classification of capital formation by the industries where the investment takes place is needed. It is suggested that for this purpose the divisions and if possible also the major groups of the International Standard Industrial Classification of All Economic Activities be used as a basis. When this is not practicable or justified by the importance of particular major groups, the classification into broader divisions may be used. Since house-ownership may be added as a separate division to the International Standard Industrial Classification of All Economic Activities, residential building may be treated as a separate category. Particularly if estimates have to be prepared for the underdeveloped countries, it may be suggested that small-scale and cottage industries be separated from manufacturing industry and that estimates be prepared for both categories. Similarly, it may be desirable to separate large-scale plantations supplying world markets from the largely non-monetary subsistence economies.

53. The statistical allocation of domestic capital formation to industries in which the investment takes place is in general difficult to make. In the United States such special purpose equipment as leatherworking, metalworking or rubberworking, textile or similar machinery was allocated to the industry which used such machinery. General purpose equipment (electric motors, steam, diesel and other prime movers, cranes, trucks, office fixtures, business machines and other movable equipment, etc.) was allocated on the basis of percentage figures obtained from trade associations and other outside sources.

54. Special problems of estimation arise in those cases where the capital formation is made internally by the enterprise concerned. Construction activity by an enterprise which is not primarily a construction firm is a good example of the problem. If, for instance, a manufacturing firm buys equipment to construct a new building, the question arises of whether the industry where this equipment is bought is the manufacturing industry or the construction industry. In general, the information on how this kind of problem has been treated in the actual estimates is not very detailed. According to the principles underlying the International Standard Industrial Classification of All Economic Activities, the internal construction activity of a manufacturing industry would have to be considered as ancillary to the main function of the enterprise. Since ancillary units are regarded as part of the main unit, the investment in construction equipment should be assigned to manufacturing industry. Similarly, in the case of transport
of transport vehicles, bought by wholesale or retail traders the investment should be assigned to commerce and not to transport.

55. In the case of capital formation made internally by an enterprise, there is a further statistical problem of how to measure the cost of the investment. If the investment is carried out by employees of the enterprise, the labor cost involved should be imputed to the project rather than treated as services used up in current production. It is unlikely that such a division of the labour costs will or can easily be made so that the internal investment may be underestimated. Internal capital formation of this kind may be more prevalent in one country than another, perhaps because of different degrees of industrial integration, so that some incomparability of capital formation estimates between countries may result.

There is also a possible source of differences in coverage owing to differences in the non-monetary area of production. In a country, for instance, where house-owners do some building by themselves, such activity is not likely to be covered. On the other hand, in a country where it is customary to hire workmen for these alterations, such transactions will more easily be included. In general this type of error is not likely to be of much significance. In countries with a largely rural economy, and particularly in the underdeveloped countries, the volume of building and repair of farm dwellings, stables, implements, etc., which remains outside the monetary sphere, may be of considerable importance. In such cases special methods will have to be used to obtain the basic data necessary to prepare an estimate of capital formation in this sector of the economy.

56. For certain purposes it is useful to present a classification of capital formation by commodity groups. For the few countries for which these classifications have been prepared in detail, they appear to differ considerably. For the present no attempt is made to propose a detailed classification of capital formation by commodity groups. A much more extensive analysis of the needs such a classification would serve and of the basic information from which the data could be derived would be necessary before proposals of this kind could be worked out. It is generally agreed, however, that for several purposes a classification into the following broad groups would be very useful:

(i) Producers' equipment
(ii) Non-residential structures
(iii) Residential building
(iv) Inventories.

/In general,
In general, the usefulness of the classification for purposes of economic analysis increases if a more detailed breakdown can be shown. Non-residential structures, for instance, may be subdivided into industrial, public utility, commercial and public buildings, following the Divisions and Major Groups of the International Standard Industrial Classification, with possible further subdivisions by industries or technical character. Equally important is a further subdivision of the estimates into investments made by corporations, unincorporated business enterprises, private non-profit institutions, and public authorities.

57. Estimates of investment in producers' equipment will have to be prepared on the basis of statistics of imports less exports and statistics of the output of new machinery and parts as shown in the Census of Industries.\(^1\) The preparation of detailed estimates will be possible only for census years. For inter-censal years estimates would have to be prepared on the basis of such estimates of output of machinery, etc., as are available. Where such statistics cover only part of the capital goods produced in industries, the results will have to be adjusted on the basis of co-efficients derived from census data. For instance it may be possible to use relationships between output per worker in the industries covered by the Industrial Census to correct the data for inter-censal years for incomplete coverage. Details of the techniques to be used for obtaining estimates for those sectors that are incompletely covered will, of course, largely depend on available basic sources of information.

58. Estimates of non-residential and residential construction may be derived on the basis of returns by contractors or figures of building licenses issued. For important types of building special returns by public authorities may exist and be useful for statistical purposes. If building permits are used, adjustments may be necessary for undercoverage, undervaluation, abandonments, areas not reporting, and delays in starting construction. In other cases estimates may be attempted on the basis of cost of building materials used, expenditures for labour, and other allowances for contractors' profits, etc. This method may have to be used also in cases where the returns by contractors or the building permits do not cover all construction work done such as, for example, minor alterations, building on own accounts, etc.

Investments in business inventories are usually very difficult to estimate. In the United States, book values of year-end inventories held by corporations are obtained from tabulations of federal income tax returns. Non-corporate

\(^1\) For a summary account of the material included in the censuses of industries of various countries, reference is made to E/CN.3/110 and E/CN.3/110/Add.1 (Form and Scope of Censuses of Industrial Production).

Inventories in each industry are estimated mainly by multiplying non-corporate sales data by coefficients indicating the ratios between inventories and sales. These ratios were obtained from special tabulations and from census data. In interpolating and extrapolating these ratios, the assumption was made that the movements are the same as for corporations in the corresponding industries.

In several countries the methods used for estimating changes in inventories are very tentative and it is usually stated therefore that the figures are subject to large margins of error.

59. As an alternative method of obtaining data on capital formation surveys of balance sheets have sometimes been used. In general, the purpose of these inquiries is not only to obtain information on capital formation but also on the financing of the investments. The difficulties that have to be overcome are usually considerable.

Information for corporations listed at the stock exchange is as a rule easily obtainable. Difficulties may arise, however, in those cases where the legal stipulations regarding the presentation of the balance sheets are not strictly enforced and as a consequence the definitions and classifications of items in the balance sheets are not uniform.

There may be a lack of uniformity among the balance sheets of firms in the same industry and/or between different industries. Of course, the uniformity of concepts used depends very much also on the uniformity of views and practices among business accountants.

As the material is assembled primarily for non-statistical purposes, the treatment of items such as profits, depreciation, investment in fixed capital and in inventories, etc., may easily deviate from the concepts used in national income and capital formation analysis. For certain firms the records may cover a financial year different from the calendar year. In general the necessary adjustments, for example to eliminate capital gains and losses due to price fluctuations, may be difficult to make.

Legal provisions regarding the registration of corporations and the submittal of annual balance sheets as a rule extend also to corporations not quoted at the stock exchange. In the latter case the information may be incomplete owing to the failure of certain companies to file returns. If, as the case may easily be, the number of non-reporting corporations varies from year to year, the material cannot very well be used to estimate year-to-year fluctuations in total investment.

Very often
Very often only the large corporations will be completely covered in a balance sheet survey and for all other corporations sampling methods may have to be used. The sampling problems in this field have not yet been examined in detail. For example, investment of individual enterprises is likely to be correlated with the level of profits rather than with the size of the capital paid up. If this statement is correct, it would have a bearing upon criteria to be applied for purposes of stratification.

60. The third method used for obtaining information on capital formation makes use of questionnaires addressed to the enterprises where the investments are made. Very often, the purpose of these inquiries is not, in the first place, to obtain data necessary to estimate the capital formation component in the national expenditure account, but to provide information necessary for analyzing trends in current and future investment programmes, for the construction of national budgets, etc.

Usually, the questionnaires are addressed to private industry only, but sometimes questionnaires are used also to obtain information on the volume and composition of capital formation from public enterprises and local authorities.

In the countries where this technique has been used the questionnaires appear to vary widely in scope and coverage.

In some cases the questionnaire distinguishes only a few broad categories of capital expenditure. In an effort not to interfere too much with business accounting practice, details of definitions and classification problems are then left to the judgment of the reporting firms. As a rule outlay on second-hand equipment and buildings taken over from others must be reported separately from outlay on new capital goods. Sales of existing capital goods previously charged to capital account must also be recorded separately.

Any capital equipment produced by the firm for its own use should be reported, and usually it is suggested that an estimate of building work, installation of equipment, etc., carried out by own labour force should also be included. Major alterations and renovations are normally included.

Normal maintenance and repairs are excluded by most countries, but in Denmark and Norway separate questions regarding these expenditures are included in the questionnaires and estimates of labour cost involved must also be reported.

The questionnaire used in the Netherlands defines as capital outlay all /investment in
investment in plant and equipment, but excludes from the inquiries employees', housing projects, and capital outlay on hospitals, recreational buildings, etc., by the reporting firms.

In the questionnaires used in Norway capital outlay on non-residential and residential buildings excludes the site values, which must be reported separately. In the questionnaire for the United Kingdom expenditure relating to the purchase of existing buildings and of land is always excluded.

The questionnaires refer to gross capital expenditure and separate questions regarding investment for purposes of replacement are usually not asked. However, the questionnaire for the Netherlands contains a separate question asking reporting firms to estimate the percentage of total capital expenditure destined for purposes of replacement of existing plant and equipment. The questionnaire for this country also contains a question concerning the method used for financing the new investment (by issuing securities, floating loans, etc.).

61. The questionnaire technique is a very important means of obtaining information on capital formation in the rural areas of the economically underdeveloped countries. In India, the National Sample Survey has been developed by the Government for the purpose of obtaining information on production, income, consumption, capital formation and savings, and the use of productive resources in the rural areas.¹ The questionnaire contains questions regarding transactions in real estate, livestock, agricultural tools and implements, consumers' durable goods, outlay for land reclamation and land improvements, farm buildings, etc., and maintenance and repair expenditure. Thus for the first time it will be possible to obtain estimates of capital formation for the whole of rural India.

62. For various purposes there is need for estimates of domestic capital formation expressed in constant prices. They are useful in relation to studies of economic growth and to reply to such questions as to whether the backlogs in investment during and after the war have been made good. They may be used in relation to estimates of real per capita income since increases in real per

¹ The National Sample Survey is a country-wide multi-purpose survey covering 1,800 sample villages distributed into about 600 strata by population or area. The number of sample villages is selected in each stratum with probability proportional to the area of the village (or population), or at random when neither population nor area figures are available. The technical aspects of the Survey have been discussed by the Sub-Commission on Statistical Sampling at its fourth session, 5-15 September 1950 (E/CN.3/114, paras. 58).
capita income in general require a volume of new capital formation at a sufficiently high level.

After what has been said in previous chapters about the conceptual and statistical problems involved in measuring capital formation, the problems involved in expressing national income in constant prices must obviously be considerable. So far, only a few countries have published series of capital formation in constant prices. In some cases, private research institutes have attempted to adjust the official estimates for changes in prices. In general, the methods used consist in the construction of price indices for the various components of gross capital formation; because of changes in the composition of total capital formation, these components should be as homogeneous as possible. More perhaps than in any other field or price indexes, the compilation of appropriate prices of capital goods is made extremely difficult by changes in quality and design. As in other fields of price statistics, the problem of establishing the appropriate price indices would have to be studied in co-operation with commodity and price experts in the particular field.

In the few studies that have been published so far, use has been made of whatever price indices were available. They were taken, for instance, from existing group indexes of index numbers of wholesale prices, or export prices obtained from foreign trade statistics were used as a substitute. Usually a prewar year is chosen as a base year and often additional computations have been carried out choosing a postwar year as a basis. Such a procedure may be recommended in general since it provides information on the effect of a change in the choice of a base period. The compilation of price indices of the type indicated is based on the assumption of absence of technical improvements, particularly with respect to capital goods and the uses to which they may be put. This assumption will be valid only over a relatively brief period. Therefore it may be recommended to revise the index, for example every five years, the base period chosen being examined as to its validity.  

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STATISTICAL COMMISSION
Sixth session
Item 10 of the provisional agenda

STATISTICS OF CAPITAL FORMATION
(Memorandum prepared by the Secretary-General)

Corrigendum

Paragraph 10, footnote 1/:
The second sentence should read:
"In the British White Papers on National Income and Expenditure the territory of these oil companies is treated as part of the national territory, investments by the oil companies are considered as part of domestic capital formation and the income of the British employees is treated as part of the national income of the United Kingdom."

Paragraph 39, lines 4 and 5:
Delete the words "With respect to a replacement cost basis."