



UNITED NATIONS  
ECONOMIC  
AND  
SOCIAL COUNCIL



Distr.  
GENERAL

E/CN.3/287  
20 February 1962

ORIGINAL: ENGLISH

STATISTICAL COMMISSION  
Twelfth session  
Item 4 (b) of the provisional agenda

SOME RECENT PROBLEMS AND DEVELOPMENTS  
IN INDUSTRIAL STATISTICS

(Report by the Secretary-General)

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## SOME RECENT PROBLEMS AND DEVELOPMENTS IN INDUSTRIAL STATISTICS

### I. INTRODUCTION

1. This paper is devoted to discussion of developments in some aspects of industrial statistics that have engaged considerable national and international attention in recent years.<sup>1/</sup> The Statistical Commission, at its eleventh session, requested that such developments be kept under review so that modifications and extensions in the concepts and methods utilized in gathering and compiling industrial statistics would be the subject of an international exchange of experience.
2. The topics dealt with in this paper consist of aspects of industrial statistics which have been the subject of modifications in concepts or practice, of important extensions in the scope of the available data, or of experimentation with new techniques of collection. The choice and definition, under various circumstances, of the statistical and tabulating unit and techniques for delineating the relationship between those units are discussed in this paper in view of the widening range, in recent years, of statistical and tabulating units in use and the attention that has been devoted to these questions. The new or improved data that are covered in this paper relate both to basic and current (monthly or quarterly) industrial statistics. Data on the value of the stock of industrial fixed assets, on the elements of costs other than wages and salaries and industrial costs (i.e., cost of the commodities consumed in production and of industrial activities sub-contracted out), on the details of raw materials consumed, and on the classification of industrial shipments or sales according to kind of customer exemplify major extensions in recent years in the available basic statistics.

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<sup>1/</sup> Industrial statistics, as utilized in this paper, relate to data on the mining, manufacturing, construction and the electricity and gas producing and distributing industries - i.e., Divisions 1-4 and Major Group 51 of the International Standard Industrial Classification of all Economic Activities. The activities of those industries are termed industrial activities and the industries are referred to collectively as the industrial sector of the economy.

Developments have also taken place in the case of current statistics for monthly or quarterly data on capital expenditures, inventories, sales and orders. A section of this paper is devoted to techniques for gathering data on the construction industry and activities, on which adequate data are lacking in a number of countries. Finally, some recent advances in compiling basic industrial statistics are considered.

## II. STATISTICAL AND TABULATING UNITS

3. In a significant number of countries, increasing use is being made of more than one concept of the statistical unit in gathering data on the real or physical (i.e., other than those that are essentially financial in character) resources and activities of industrial units. The shift in emphasis in those countries to the use of more than one kind of unit reflects efforts to adapt the statistical and tabulating unit to the specific requirements for various kinds of industrial data and the circumstances under which these data are gathered - for example, the detail in which, and the speed with which, the data are wanted and the way in which businesses are organized and keep records on the items to which the data relate. The efforts to adapt the unit to the circumstances in which it is utilized have also led to study and discussion, at national and international levels, of the appropriate statistical and tabulating unit for various situations and of suitable ways to define these units. Further, the use of more than one unit in gathering industrial statistics has led to increased attention and work on delineating the structural and statistical relationships between the various units, particularly as part of basic censuses of the industrial sector.

4. It should be emphasized that the developments outlined in the preceding paragraph are confined to countries with highly industrialized, market economies. In the countries with centrally planned economies, the enterprise, defined so that it is engaged in a relatively limited range of activities, remains essentially the only statistical and tabulating unit in use though some of these countries have also gathered selected data, at infrequent intervals of time, on the separate locations at which some enterprises engage in industrial activity. Because in those countries the organization of separate enterprises is based on technological, economic and administrative considerations and the record-keeping practices of these enterprises are uniformly defined, taking into account the statistical and other requirements for information, the problems that confront other countries in selecting appropriate statistical and tabulating units do not arise.

5. Countries with less industrialized, market economies also continue to use essentially a single statistical and tabulating unit - namely, the establishment or the equivalent local unit - for the collection of data on the physical resources and activities of industrial units. In these economies relatively few

businesses are so complex as to render this unit unsuitable. On the other hand, this unit has the advantage that it yields data classified by detailed categories of industrial activity, size, and location, all of which particulars are required in the planning and evaluation of economic progress. Even in the very highly industrialized, market economies the typical business consists of one ownership engaged in one kind of activity at one location, with the consequence that for most businesses the establishment, local unit, kind-of-activity unit and enterprise are practically identical.

A. THE ESTABLISHMENT AND LOCAL UNIT

6. The establishment or the local unit, the equivalent of the establishment in most instances, remains the primary, but not the sole, statistical and tabulating unit in infrequent benchmark censuses of industrial units. Countries propose, for example, to employ the establishment or its equivalent in the inquiries that they take as part of the 1963 World Programme of Basic Industrial Statistics. This is the case because the use of the establishment permits the classification of data on the labour and other resources employed by, and the key inputs and outputs of, industrial units according to the most precise and homogeneous classes of kind of economic activity, size, geographic area, etc. that are generally feasible; and the infrequent, basic censuses are designed to yield as much detailed information as is practical on the character and structure of the industrial sector and on the experience and efficiency of various types of industrial units. The establishment or its equivalent relates to the unit of management covering the narrowest range of activities carried on by a single legal entity in the smallest geographic area which maintains separate records on all of the topics that are of interest in infrequent, benchmark censuses of industrial units. In practice, the establishment has been, and has to be, defined in terms of the situation that prevails in any country with respect to the sub-division of the various kinds of activities carried on by a legal entity at various locations into separate management and record-keeping units. These criteria for defining the establishment usually result in coincidence between establishments and local units, and may lead to significant differences between countries in the degree of homogeneity of the establishments that it is feasible

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to delineate. In the case of local units distinctions are drawn, if feasible, between the different locations at which the same ownership operates but not the different kinds of activities carried on at each location. In order to minimize the differences in degree of homogeneity between establishments in any one country, it is generally agreed that where the kinds of activities covered in a local unit are more varied, to a significant extent, than those for which separate records are generally available, efforts should be made to sub-divide the local unit into separate establishments. The most detailed distinctions between kinds of activities that a country has found it practicable to make in the industrial classification scheme can serve as a guide in those efforts.

7. It is evident from the preceding paragraph that a number of basic activities may be covered in at least some establishments and that the homogeneity of establishments or the equivalent local units may differ from one country to another or even in any one country. In order to reduce the range of activities encompassed, some countries have sought data for sub-divisions of the establishment or local unit - namely, for technical and ancillary units. The technical unit is limited to each section or department that engages directly in the production of a class of the commodities or services provided by the establishment or local unit or in a stage in the production of these commodities or services; and the ancillary unit is restricted to each section or department that primarily furnishes a type of service or produces a class of goods for the use of the establishment or local unit. The goods or services provided by the ancillary unit do not become part of the services rendered or the goods shipped by the establishment or local unit. However, the restraints imposed on the scope of technical and ancillary units generally limit the data that can be gathered for these units to the labour and other resources directly employed, and the quantity of goods directly produced. The technical or ancillary units therefore cannot serve as general purpose statistical or tabulating units. In order to indicate the degree of homogeneity achieved in the establishments or their equivalent, some countries (e.g., Canada, Hungary, Poland, the United Kingdom and the United States) have compiled measures of specialization, based on figures showing the relationship between the output of the goods and services primary to the class of industrial activity, in which the establishments fall and the output of all goods and services of these establishments.

8. A number of countries with highly industrialized, market economies - for example, Australia, Canada, Japan, the Scandinavian countries, South Africa and the United States - continue to rely on the establishment for purposes of gathering practically all types of data on the real resources and activities of industrial units. This is the case both for their annual inquiries in which they generally seek co-ordinated data on various aspects of industrial resources and activities and for more current specialized surveys devoted to the employment and compensation of labour, capital expenditures, inventories or output of industrial units. It should be noted, however, that some of those countries utilize broader statistical units in gathering some kinds of current data and are making increasing use of the enterprise as a supplementary statistical unit. For example, Canada and the United States employ the enterprise or kind-of-activity unit in monthly surveys of inventories, sales and orders since at least some of these figures are not readily available for establishments; and Japan, some of the Nordic countries and the United States have utilized the enterprise in addition to the establishment in their benchmark censuses. The countries under discussion in this paragraph continue to utilize the establishment in annual and more current surveys, as well as in benchmark censuses, because of (i) their requirements for annual and more current data classified according to rather precise categories of industrial activity and, in some cases, according to geographic area and (ii) the operational and analytical advantages of employing the same statistical and tabulating unit in as many industrial inquiries as is practicable. Further, these countries have evidently not encountered significant difficulties in making general use of the establishment.

9. Other countries with highly industrialized, market economies - for example, the Federal Republic of Germany, France, Italy, the Netherlands and the United Kingdom - utilize a broader statistical unit than the establishment or local unit in a number of annual or more current surveys. Most of these countries utilize the establishment or local unit in gathering monthly or quarterly data on the employment and compensation of labour and the quantity of products made. However, all of these countries employ the kind-of-activity unit and/or enterprise in specialized investigations into other aspects of the real resources and activities of industrial units or in extensive annual or similar surveys of the

inputs and outputs of various industrial units. Some of the countries (e.g., the Netherlands and the United Kingdom) have replaced the establishment or its equivalent by a broader unit, whereas other countries (e.g., the Federal Republic of Germany and Italy) have started with the enterprise or kind-of-activity unit. The countries under discussion in this paragraph have utilized the kind-of-activity unit or enterprise in a number of annual and more current inquiries primarily for reasons of convenience and practicality. They have faced significant problems and difficulties in using more precise statistical units and they do not consider it nearly as essential to have as detailed classifications of data in annual, quarterly or monthly surveys as in infrequent inventories of the characteristics of industrial units.

#### B. THE KIND-OF-ACTIVITY UNIT

10. It has already been indicated above that an increasing number of countries are utilizing the kind-of-activity unit in annual and more frequent inquiries into industrial units. Italy employs the kind-of-activity unit to gather figures of the various inputs and outputs of larger enterprises in an annual inquiry into value added. The Netherlands is now utilizing the kind-of-activity unit to gather annual or more frequent data on stocks and consumption of raw and other materials, stocks, shipments and output of products, work-in-process and the labour directly engaged in production; but the enterprise is used to collect data on other aspects of the real resources and activities of industrial units. The United Kingdom began use of the kind-of-activity unit in the 1959 Annual Sample Survey of Production, in which data were sought on capital expenditures, inventories and sales. The United Kingdom conducts a quarterly survey into almost the same items for the same unit. On the other hand, the United States is shifting from the enterprise to the kind-of-activity unit in a Monthly Survey of Manufacturers' Sales, Orders and Inventories.

11. The countries that employ the kind-of-activity unit in annual and more current surveys are evidently seeking data classified according to as precise classes of industrial activity as are feasible. As compared to the establishment, the kind-of-activity unit distinguishes between the various classes of activities engaged in by a single ownership (enterprise) but not between the various

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locations at which each of these classes of activities is carried on. In annual and more current industrial inquiries, where classifications of data according to geographic area may not be needed, it would therefore be advantageous to utilize the kind-of-activity unit if the difficulties and costs of gathering, compiling and using the data are reduced. Both the Netherlands and the United Kingdom have indicated that they shifted to use of the kind-of-activity unit for reasons such as the preceding. However, it may be necessary to forgo some detail in the classification of the data according to kind of industrial activity. In view of the breadth of the separate classes of activity (e.g., divisions) into which the head management and associated records of a large enterprise may be sub-divided, it may not be feasible to set up kind-of-activity units that cover a relatively narrow range of activities. That is likely to be the case particularly where, as in Italy and the United Kingdom, data are sought on items which are not directly a part of production. For example, in the Italian annual inquiry into value added, data are sought on such overhead costs as advertising, communication and similar services, and one of the advantages of utilizing the kind-of-activity unit cited by the United Kingdom was that it would provide data on the capital expenditures on factories of the enterprise that are not yet in operation, or on inventories held by separate selling organizations within the enterprise. In fact, classifications according to kind of industrial activity at about the major group level of the International Standard Industrial Classification were utilized in the Italian and United Kingdom inquiries. The United States also employs a much less detailed classification scheme in the case of kind-of-activity units than in the case of establishments. On the other hand, the Netherlands uses the kind-of-activity unit to gather data on the labour and materials directly utilized in production and on output, and is therefore able to apply a much more detailed industrial classification than the forementioned countries.

### C. THE ENTERPRISE AND LINKS BETWEEN THE ENTERPRISE AND ITS SUB-UNITS

12. An increasing number of countries are also utilizing the enterprise to gather data on the real resources and activities of industrial units. Some of these countries employ the enterprise as the sole statistical unit in gathering

selected kinds of data. For example, the Federal Republic of Germany utilizes the enterprise only in gathering co-ordinated data on the employment, inventories, costs of production, sales and output of industrial units; Italy employs the enterprise for the smaller units in its annual survey of value added; and the Netherlands uses the enterprise to gather data on capital expenditures, overhead employment, inventories and costs of production, and sales of goods in the same condition as purchased. The enterprise has been employed by these countries because they have found the enterprise much more practical or convenient and less costly and time-consuming to use than sub-divisions of the enterprise. This has been the case particularly when seeking data on items such as total inventories held, or capital expenditures made, by industrial units or the costs of production that are non-industrial in nature. In the case of the Federal Republic of Germany, additional reasons are given for utilizing the enterprise to gather data on the whole range of inputs and outputs of industrial units.<sup>2/</sup> It is emphasized that the enterprise is the most convenient unit to gather co-ordinated data of that type (since the enterprise is the statistical unit that must be employed for at least some inputs) and that little, if any, valuable information is lost when the data gathered for enterprises cannot be classified according to kind-of-activity, etc. in nearly the same detail and homogeneity as if sub-units of the enterprise were used. In this approach it is also considered essential to gather data, even with less detail, on the market transactions (i.e., with other enterprises) of the enterprise and detailed data on a mixture of market and administrative (i.e., between sub-divisions of the same enterprise) transactions are considered less useful.

13. In order to have complete data on the employment, inventories, capital expenditures or sales of industrial units, some of the countries which mainly rely on the establishment as the statistical unit have collected, or propose to seek, data on these items for central ancillary units of enterprises to supplement those gathered from its constituent operating industrial establishments.

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<sup>2/</sup> See: The Statistical Unit in Economic Statistics, Studies on Statistics, No. 6, June 1958; and Considerations on the Census Programme, Studies in Statistics, No. 4, September 1957, Federal Statistical Office.

The United States followed that practice in gathering data from the central offices of large enterprises in its last two benchmark censuses; and some of the Nordic countries propose to designate central offices, central warehouses or other important ancillary units serving more than one operating industrial unit of an enterprise as special reporting units in order to accomplish the same purpose.<sup>3/</sup> By use of such an approach, the employment at, the inventories held by, and the sales from, central ancillary units, as well as the capital expenditures on units not yet in operation, would be included in the industrial statistics that are gathered.

14. Some countries which use sub-divisions of the enterprise, mainly or entirely, to gather data on the real resources and activities of industrial units, are employing the enterprise as a supplementary statistical or tabulating unit. In their infrequent, basic censuses, for example, Brazil, Finland, Japan and the United States have used the enterprise in addition, to the establishment for purposes such as the following: (i) to eliminate any gaps or overlapping in the coverage of establishments between the questionnaires for the industrial sector and those for other sectors of the economy; (ii) to delineate the structural and statistical relationships between the two types of units; and (iii) to describe the industrial sector in terms of enterprises. The Netherlands employed the enterprise, local unit and technical unit in its last Census of Non-Agricultural Establishments for the same purposes.<sup>4/</sup> In employing the enterprise for that purpose a number of the countries have gathered information only on selected characteristics of the enterprises and their composition in terms of establishments or local units. Further, Denmark and the United States have utilized the enterprise in their most recent benchmark censuses in order to gather data which did not lend themselves to convenient use of the narrower statistical unit. Denmark sought figures of wages and salaries, sales and the elements of

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<sup>3/</sup> It should be noted that the International Recommendations in Basic Industrial Statistics (Statistical Papers, Series M, No. 17, Rev.1) provide for such a procedure.

<sup>4/</sup> For a description see: Methods and Procedures of the Netherlands Census of Industries, 1950; Statistical Studies No. 8, April 1957, The Netherlands Central Bureau of Statistics.

value added for the enterprise where several local units were in fact jointly administered through a central office; and the United States gathered figures for the enterprise on the value of shipments of goods or services rendered to various types of customers. It should be noted that in the latter case, though the enterprise was utilized as the statistical unit, data were gathered on goods shipped or services rendered within the enterprise (i.e., between its various establishments) as well as to other enterprises.

15. The 1963 Programme of Basic Industrial Statistics for Europe provides for the use of the enterprise in order to gather data supplementary to those sought for the establishment or an equivalent unit; and a number of European countries propose to utilize both types of statistical and tabulating units in the inquiries that they take as part of the 1963 Programme.<sup>5/</sup> The European programme for enterprises covers all the main items of data included in the programme for establishments and it provides that the data for enterprises may be assembled from those gathered for establishments or sought independently for enterprises. In either case, it would be necessary to identify the establishments or equivalent units that make up each enterprise. The European programme is designed to yield data that describe the structure and activities of the industrial sector in terms of enterprises, that furnish, in conjunction with the available financial data for enterprises, convenient figures for use in national accounting and related work, and that delineate the structural and statistical ties between enterprises and establishments or the equivalent units.

16. Information on the ties between enterprises and establishments or equivalent units is wanted for such purposes as correlating inquiries taken and data gathered on the basis of these two types of statistical units and measuring the degree to which classifications of data for the units differ from one another. For those purposes it would generally be necessary to cross-tabulate data (e.g., employment or value added) according to some common characteristic (e.g., kind of industrial activity) for enterprises and their constituent units. The United States has done

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<sup>5/</sup> For the contents of the programme see: 1963 European Programme of Basic Industrial Statistics, Conf. Eur. Stats/WG.13/15, Part III.

that as part of its benchmark censuses, and the European programme includes such tabulations. In the 1954 Censuses of Business Manufactures and Mineral Industries of the United States, data on employment were cross-tabulated according to such characteristics as the industrial classification of the enterprise and of its constituent establishments, and the size of the two types of units.<sup>6/</sup> A more ambitious programme of cross-classifications is planned for the 1958 Censuses. Data on the structure and activities of the industrial sector in terms of enterprises are of interest for such purposes as ascertaining the way in which the ownership and control of industrial resources and activity are distributed and the behaviour of industrial units in the market. For these purposes, classifications of the data are needed according to characteristics of the enterprise only. The European programme also includes these tabulations.

17. Whether countries utilize the enterprise as a primary or supplementary statistical or tabulating unit, they often employ different concepts of the enterprise. A number of countries restrict the enterprise to the single legal entity (i.e., the individual proprietorship, partnership, corporation, co-operative, etc.) since the legal entity is easily identified and is the common unit for which financial and related statistics that are a by-product of governmental administration are available. Further, since the legal entity is the narrowest kind of enterprise unit, data gathered for the legal entity may be tabulated according to more detailed and homogenous classes of industrial activity, size, etc. than where a broader concept of the enterprise is utilized. Though it is recognized that the single legal entity may not be the appropriate unit to utilize in studies of the concentration or dispersion of the ownership or control of industrial resources and activities, the legal entity is considered by those countries a suitable unit, on the whole, for studying market transactions. Other countries have utilized families of interrelated legal entities in defining the enterprise. These countries have followed such an approach so as to approximate the groups of legal entities for which, in their economy, common decisions and action are in fact taken as well as to have the data

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<sup>6/</sup> See: U.S. Censuses of Business Manufactures and Mineral Industries 1954, Company Statistics; Bulletin CS-1, U.S. Bureau of the Census, 1958.

required for studies of the distribution of ownership and control of industrial resources and activities. In the case of some of these countries, it is also considered that the problems of gathering data for families of legal entities are simpler than those of single legal entities because of the formal and artificial character of some legal entities. Families of legal entities have been defined in differing ways and with varying scope, depending on the circumstances in which they were being utilized as statistical and tabulating units. Definitions of varying breadth have been utilized so as to make it practicable to identify the most appropriate family of legal entities and gather the data sought. Canada, the Netherlands and the United States are examples of countries which utilize families of legal entities as enterprises. The Netherlands defines the family of legal entities as the group which actually functions as a single financial and economic entity. Canada and the United States focus attention on common ownership or control. The United States, in some inquiries into financial data, has included the condition that consolidated profit-and-loss statements and balance sheets be available in addition to the condition of common ownership.

18. The 1963 European Programme allows for use of any of the concepts of the enterprise mentioned in the preceding paragraph. The legal entity is defined as an individual proprietorship, association of persons or an organization owning or carrying on a business undertaking. The family of legal entities may be the group of legal entities bound together by ties of ownership or the portion of the family for which consolidated profit-and-loss statements and balance sheets are available. "Ties of ownership" is defined as more than 50 per cent ownership of the equity (or net worth) of each legal entity by the other members of the group.

### III. EXTENTIONS OR IMPROVEMENTS IN BASIC DATA

#### A. VALUE OF THE STOCK OF FIXED ASSETS

19. In view of the urgent requirements for data on the value of the machinery, equipment and plant of industrial units, some inquiries have been conducted, or other efforts have been made, in recent years in order to gather these data in suitable form. Data on the stock of fixed assets held by industrial units are wanted, for example, for measures of the fixed assets and productive capacity available to various types of industrial units (e.g., those engaged in various kinds of activities or differing in size) and of the productivity and extent and efficiency of use of the physical fixed capital. Those measures are basic to such endeavours as assessing the potentialities and adequacy of the current stock of productive capital resources in various kinds of industrial units, charting expansion in industrial activity, and watching the rate of growth in industrial capacity and productivity. Data on the value of the machinery, equipment and plant of industrial units that would be suitable for such purposes are however not readily available from business accounts. The entries in capital accounts, often, at the original cost of the fixed assets reduced by accumulated depreciation and related charges, are hardly suitable. The machinery, equipment and plant will have been acquired at differing times over a considerable period; and because of changes in costs of production, technology and the structure of prices since the time of acquisition, the original cost of those physical assets will reflect, poorly, and fortuitously, the present cost of acquiring the machinery, equipment and plant in the same condition as when originally purchased. Further, the methods of making depreciation, obsolescence and related charges to the accounts will vary significantly from one business to another and may bear relatively little relation to actual use of, and wear and tear in, the machinery, equipment and facilities. Because of such deficiencies in the book values of fixed assets, a number of countries abandoned the collection of these data years ago; and alternative approaches have been attempted in recent years in order to gather suitable figures of the value of the stock of industrial fixed assets.

(a) Direct Inquiries into Stock of Fixed-Assets

20. Japan, as part of a comprehensive survey of the reproducible wealth held by the residents of Japan as of the end of 1955, sought data on the value at replacement cost of the fixed assets of industrial units other than land and other natural resources.<sup>7/</sup> All electricity and gas enterprises were asked to supply, for a sample of physical assets, the data required to revise to current replacement cost the figures of value that are continuously maintained. For the business sector, including industrial units other than electricity and gas enterprises, a sample was selected consisting of 6,000 corporations and 17,000 other kinds of enterprises. The business units included in the sample were asked to supply data on their fixed assets classified in sufficient detail so that estimates of value at current replacement cost could be prepared by the Economic Planning Agency of the Government. Data were collected in terms of the original full cost of the fixed assets and showed the year of their purchase. To aid in calculating the current equivalent of the original cost, the Economic Planning Agency prepared tables showing the ratio of 1955 prices to the prices in each year, 1871-1955, for each class of fixed and other physical assets. In calculating the accumulated depreciation charges on the fixed assets, the durability of each class of fixed assets (as estimated by the Ministry of Finance) was used in conjunction with the current replacement cost, new (i.e., the fixed assets in their original condition). For assets whose life had expired according to the tables of the Ministry of Finance, the Economic Planning Agency prepared its own tables for observed durability of 2 to 100 years. For equipment used in mining, depreciated values were directly adjusted to 1955 prices. Depreciation in value due to damage or to obsolescence was estimated on the basis of specific investigations.

21. The Union of Soviet Socialist Republics undertook an inventory, as of 1 January 1960, of all depreciable fixed assets in state-owned enterprises and co-operatives. It should be noted that similar inventories have been taken in

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<sup>7/</sup> See: National Income Accounts, 1957 and National Wealth Survey, 1955, Economic Bulletin No. 1, Economic Research Institute, Economic Planning Agency, Japanese Government, February 1959.



Czechoslovakia, Poland and Yugoslavia. Buildings and structures, machinery and equipment, and means of transport were included in the inventory. These fixed assets were valued at the current replacement cost, new (i.e., the current costs of acquiring them in their original condition), and accumulated charges for actual physical depreciation assessed against each item. Lists of all fixed assets, showing the physical condition and other characteristics of each item, were prepared by each enterprise during the period, 1 September to 31 December 1959. Each enterprise valued its various fixed assets at current cost of replacement, new, and assigned accumulated charges for physical depreciation, based on detailed price lists and instructions supplied by the Central Statistical Board. The completed lists of fixed assets were reviewed and summarized by the supervising organization for each enterprise, and the summaries were sent to the Central Statistical Board. These reports were verified at the Central Statistical Board by checking the documentation for a 5 per cent sample of the items listed for each enterprise. When such inspection disclosed irregularities in valuation, a revaluation of all items was made.

22. The detailed price lists for structures, pipelines, railroad lines and other construction showed the current unit-cost of replacement, new. The unit of measurement was, for example, a cubic metre of space in the case of structures and a kilometre of length in the case of pipelines and railroads. Unit-costs were shown for each type of structure or other construction made of various kinds of materials or in various dimensions, under differing conditions (e.g., at various locations in the case of structures). The unit-costs were based on all the expenditures involved in construction, including the provision of the usual facilities such as water, electricity, and sewage disposal, plus the normal margin of overhead and profit. If the detailed price list did not show the unit-cost of construction for a particular kind of structure or facility that was to be valued, the unit-cost of an analogous type of structure or facility was utilized to the extent possible. In the case of structures or other constructions made of obsolete materials or according to abandoned methods, the most similar new kind of construction was utilized. If a suitable prototype could not be found in the price list, recourse was taken to adjusting the original cost of the structure or facility to current prices by means of the appropriate indicators of change in prices.

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23. The detailed price lists for machinery, equipment and means of transport showed the current cost of replacement, new, of various types of those fixed assets or of component parts or assemblies. Domestic, imported and obsolete machinery and equipment were covered in the price lists. The current cost of replacement for various pieces of machinery, equipment and means of transport took account of all costs of acquisition through installation, and was based on the current wholesale prices at which the item was sold or at which contracts were being negotiated plus other current costs (such as for packaging, freight, installation) not included in these prices. Where a particular item was not shown in the price lists, the current cost of replacement was determined from that for an analogous item that was shown in the price list, adjusted for the differences between the two in capacity, productivity and/or efficiency. For example, in the case of power equipment, both capacity and consumption of energy per unit of output were utilized. In the case of other machinery, output per unit of time or norm-hours of operation was employed. For complex prices of machinery or equipment, values were ascertained from the sum of the prices listed for component parts or assemblies. The values listed for the various kinds of fixed assets took account of the effects of advances in technology and similar changes, for example, of declines in value due to obsolescence.

24. Depreciation was assessed against each fixed asset in terms of percentage of current cost of replacement, new, based on (i) detailed evaluation of the current physical and technical condition of the item, (ii) the period of use of the item in relation to its estimated life, or (iii) the amount of work already performed by the item in relation to that estimated for its entire period of use. The first method of evaluating depreciation was preferred, particularly if applied to the various parts of a fixed asset. In evaluating the current physical and technical condition of an item, account was taken of factors such as materials of which it was made, the conditions under which and the extent to which it had been utilized and damaged, and the frequency and type of repairs and alterations. If the percentage of depreciation of an item was based on that of its various parts, it was computed as the weighted arithmetic mean of the percentages of depreciation for each of the parts. If the latter two methods of assessing the percentage of depreciation were utilized, estimates of the remaining life of the fixed asset or the output during its remaining lifetime were based either on average expectations or on estimates made by experts of the remaining years of service or output during those years.

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(b) Valuation for Fire Insurance Purposes

25. In some countries (e.g., Ireland, Norway, Sweden and the United Kingdom), inquiries into the value at which machinery, equipment and plant are insured against fire and similar hazards have been taken, as a means of gathering suitable figures of the value of the stock of fixed assets. In the case of Ireland, figures of the valuation for insurance purposes of all buildings, plants and machinery of large (those employing 20 or more persons in 1957) mining, manufacturing, electricity and gas enterprises were sought by the Central Statistics Office as part of a 1960 voluntary inquiry into physical and financial capital. Data were also gathered on the depreciated values of those fixed assets shown in the books of the enterprises. About 70 per cent of the number of enterprises included in the inquiry furnished reports. Roughly a tenth of the respondents provided incomplete figures of the valuation of fixed assets for insurance purposes. The incomplete figures were concentrated in particular industries where part of the plant is not subject to the danger of destruction by fire and is therefore not insured. Where no data were furnished, insurance was not being carried or the pertinent queries were not answered. The figures reported on the valuation for insurance purposes of the fixed assets exceeded those reported on the depreciated book value of the same assets. The Irish statistical authorities believe that, in general, the valuations for insurance purposes that were reported approximate the replacement cost.

26. As part of the 1953 Census of Non-Agricultural Establishments in Norway, data on the full insurance value of various types of fixed assets were sought for all establishments and published classified according to the kind of industrial activity of the establishments. In the United Kingdom, data for 1955 on the valuation of fixed assets in insurance for reinstatement after damage or destruction by fire, were sought in a voluntary sample survey taken by the National Institute of Economic and Social Research.<sup>8/</sup> The inquiry covered a sample of manufacturing enterprises with depreciated book values of five million pounds or more for fixed assets. The values set for fixed assets in fire insurance for reinstatement were considered to be the same, conceptually, as the

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<sup>8/</sup> For a full description of the inquiry see: "The Replacement Cost of Fixed Assets in British Manufacturing Industry in 1955" by T. Barna, Journal of the Royal Statistical Society, Series A (General), Volume 120, Part I, 1957.

current cost of replacing these fixed assets in their original condition - i.e., without any deductions for depreciation - though it was recognized that the fixed assets may, in certain circumstances, be under-insured. Adjustments for such under-insurance were in fact made in the data that were gathered. Somewhat less than half of the 228 enterprises included in the sample supplied usable returns. Among those that responded, the figures provided, as in the case of the Irish inquiry, did not cover certain kinds of fixed assets which were considered to be undamageable by fire and were therefore not insured against this risk. Further, some of the figures related to the depreciated current value of the fixed assets rather than to current cost of replacement, new. Adjustments were made for the preceding deficiencies in the data that were reported. When making such adjustments, it was discovered that some enterprises had, for internal use, estimates of the current cost of replacing fixed assets in their original condition, whether or not the assets were insured against damage or destruction by fire.

(c) The Perpetual Inventory Method

27. In view of the availability, in a number of countries, of suitable annual data on the expenditures on new fixed assets of industrial, as well as other kinds of units, these data have furnished the basis for an indirect approach - the perpetual inventory method - to estimating the replacement cost of the stock of fixed assets, new or depreciated, valued at prices prevailing in some current or past year. The perpetual inventory approach has been utilized, for example, in making these estimates for Argentina, Australia, Canada, the Federal Republic of Germany, Norway, South Africa, the United Kingdom and the United States.<sup>9/</sup> The Dominion Bureau of Statistics of Canada is experimenting with the perpetual inventory method.

28. The perpetual inventory method of estimating replacement cost, new, of the stock of fixed assets consists essentially of accumulating figures of expenditures on various kinds of fixed assets over a considerable number of years and adjusting

<sup>9/</sup> For the estimates and descriptions of the sources and methods of estimation see: The Measurement of National Wealth, International Association for Research in Income and Wealth, Income and Wealth Series, VIII; Output, Labour and Capital in the Canadian Economy, Wm. C. Hood and Anthony Scott, Royal Commission on Canada's Economic Prospects; "Net Investment in Fixed Assets in the United Kingdom", P. Redfern, Journal of the Royal Statistical Society, Series A (General), Vol. 118, Part 2, 1955; "A Perpetual Inventory of National Wealth", R.W. Goldsmith, Studies in Income and Wealth, No. 14, National Bureau of Economic Research, New York.

the figures for each year to the prices prevailing in a given current or past year. Estimation of replacement cost, depreciated, involves the additional steps of deducting the appropriate charges for depreciation from the replacement cost, new, of the various kinds of fixed assets acquired during each year. The charges for depreciation are usually expressed as a percentage of the replacement cost, new. These percentages of course reflect the elapsed time between the acquisition of the fixed assets and the year for which estimates of replacement costs, depreciated, are being made as well as the expected life of the fixed assets and the method of depreciation (e.g., whether straight-line, declining percentage, etc.).

29. Figures for a considerable number of years on annual expenditures on new fixed assets, classified, in some detail, according to type of fixed asset and kind of industrial activity, are desirable in order to have a firm basis for making the perpetual inventory estimates. This is the case since, as the expected life of some fixed assets (e.g., structures) is extended, the changes in prevailing prices over any period will differ from one kind of fixed asset to another, and rates of depreciation will vary according to both the type of fixed asset and the circumstances under which it is used. Further, to be most useful, estimates of replacement cost, new or depreciated, are wanted classified according to at least broad types of fixed assets and classes of industrial activity. Some countries which survey expenditures on new fixed assets, gather annual data on these expenditures in adequate detail. In other countries, it is necessary to utilize a combination of the commodity flow and expenditure approaches to estimating gross fixed capital formation in order to have the basic data in the desired detail. At this juncture, few, if any, countries have reliable and adequate data on gross fixed capital formation for a long enough period of time to base the estimates of the stock of fixed assets on these data only. Thirty years has been considered a minimum period. As a consequence, in many of the applications of the perpetual inventory method, use has been made of figures of the book value or other valuations of the stock of fixed assets held by industrial and other kinds of units as a starting point for accumulating the figures of annual gross fixed capital formation. In at least one instance - that of Norway - use has been made of a combination of data on the full value, for fire insurance purposes, of the stock of fixed assets at various points of

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time and data on annual gross fixed capital formation. It is of course desirable that the data on the starting inventory of fixed assets be classified according to at least the average age of the various kinds of fixed assets in addition to showing the detail indicated above for capital expenditures or gross fixed capital formation. The effects on the estimates of deficiencies in the data on the starting inventory of fixed assets lessen as the span of time between the year of the inventory and the year for which estimates are being made increases.

30. Significant problems have been encountered in utilizing the perpetual inventory approach because of inadequacies in available information on prices and appropriate rates of depreciation. The construction of comparable price series or indexes for capital goods is a complex and difficult task; and very few, if any, countries have adequate or reliable data of this kind for any extended period of time. The uniqueness of transactions in many types of capital goods, the complex character of fixed assets, and the important changes over time in technology and the design and composition of a significant part of these goods all contribute to the lack of the desired price data. Recourse has therefore had to be taken to price series or indexes on more standardized, much simpler items to represent the movement in prices of many types of capital goods. Persons utilizing the perpetual inventory method have also had to make decisions concerning rates of depreciation without having adequate information about the actual average life, or the frequency distribution for this characteristic, of various kinds of fixed assets used under varying circumstances or the pattern in which physical depreciation takes place. Because of such inadequacies in available information, in some applications of the perpetual inventory method, deductions have not been made for depreciation. Rather, fixed assets have been dropped from the estimated stock after a given number of years. It should also be noted that in applying the perpetual inventory method, obsolescence has not been taken into account in estimating replacement cost, new or depreciated, no doubt because of the difficulties of attempting this.

31. Nevertheless, the perpetual inventory method of estimating replacement cost, new or depreciated, does yield data priced and depreciated in a uniform fashion. Also the exact methods of pricing or depreciating are known and the resulting deficiencies in the estimates can be taken into account in making use of the

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estimates under various circumstances. Further, the same kinds of decisions on prices and rates of depreciation, whether explicitly or implicitly made, would be required in any of the alternative approaches to gathering data on the value of the stock of fixed assets; and the use of the perpetual inventory method clearly indicates the areas of required improvement and extension in the required data and information for making these decisions. Also, the data on annual capital expenditures required for use of the perpetual inventory method are much more readily available than the inventory data on the stock of fixed assets needed in other approaches. The forementioned attributes of the perpetual inventory method have been considered, in some quarters, to be advantages, in the case of market economies, over direct approaches to valuing the stock of fixed assets.

#### B. DETAILED INFORMATION ON MATERIALS CONSUMED

32. The construction of input-output tables requires extensive and precise data on the commodities produced and consumed by industrial units, particularly if a considerable number of categories of industrial activity are shown in the table. The type of information ordinarily provided by censuses of mining and manufacturing on the output of commodities serves this purpose reasonably well, though greater detail could often be used to advantage. Information on the consumption of specific materials and components tends to be confined to a limited list of those which are widely used and have a large value. A consequence is that the figures gathered for a category "all other materials and components" often account for a large portion of the value of all materials and components consumed, and the industrial origin of these items cannot be identified. In order to have the missing information, ad hoc or other kinds of inquiries have been organized in various countries. Below the surveys conducted in the United States will be described.

33. A voluntary survey was conducted in the United States for 1949, based on a subsample of the establishments included in the 1949 Annual Sample Survey of Manufactures. Detailed data were sought in this survey on the purchase and consumption of more than 200 components by establishments in the metal-working industries. A similar survey was taken for 1959 for a somewhat more limited list of components. Returns were obtained from about 80 per cent of the

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establishments to which questionnaires had been sent, and the information thus obtained was sufficient to cover about 85 per cent of the content of the item, "all other materials, components, and supplies", reported in the 1958 census by those industries. The information obtained was specific enough to permit the identification of the industries supplying the components. An additional value of the earlier survey was the insight gained into the record-keeping practices of respondents and the sources of misunderstanding and hence misreporting of the cost of materials, supplies, containers and the like.

C. EXPENSES OF PRODUCTION OTHER THAN WAGES AND SALARIES AND INDUSTRIAL COSTS

34. The data that are gathered as part of industrial inquiries often do not cover such expenditures of industrial units as contributions to social insurance and welfare schemes for employees, payments for transportation, communication, advertising, rent and other services that are non-industrial in character, depreciation or like expenses. The traditional omission in a number of countries of data on such expenses reflected the relatively small share of the expenses in the total costs of production as well as the difficulties encountered in gathering suitable data on them. However, the magnitude of expenditures on fringe benefits for labour and on non-industrial services has been increasing and the requirements for data gathered directly from industrial units on those and other expenses, in addition to the traditionally gathered figures on wages and salaries and costs of commodities consumed and of sub-contracted work (i.e., industrial costs), have become more evident for such purposes as national accounting work and assessing the costs and efficiency of various kinds of industrial units. As a consequence, an increasing number of countries are seeking, through regular or special inquiries, data on the supplementary labour costs of industrial units and their expenditures on non-industrial services, taxes and the like.

(a) Supplementary Labour Costs

35. A number of American and European countries are now gathering data on the contributions of industrial units to social insurance, pension, welfare and like schemes as part of regular industrial inquiries. For example, Brazil, Chile,

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Colombia and Mexico have all included questions on such expenditures in their recent industrial censuses or similar annual surveys. The Federal Republic of Germany, Ireland, the Netherlands, some of the Nordic countries, and all of the countries with centrally planned economies have also gathered figures of those expenditures as part of regular inquiries into the various expenditures of industrial units on labour, commodity and other inputs and into industrial production. In the case of the United States, figures of expenditures by industrial units on social insurance, pension, welfare and like schemes were collected in a sample survey supplementary to the 1958 Census of Manufactures. The need for and the practice of gathering data on employer expenditures on social insurance, welfare and like schemes have in fact become common enough for the Commission to indicate, in the international recommendations on basic industrial statistics adopted at its eleventh session, the desirability of gathering these data.

36. The experiences of the countries which have gathered data on the contributions of industrial units to social insurance, pension, welfare and similar schemes for their employees have emphasized the need explicitly to identify and define the schemes on which data are being sought. Otherwise, the data gathered may fall short of including all the different kinds of contributions that are to be covered or they may cover, in addition, expenditures that are not to be included. This is the case because employers make many kinds of expenditures on account of the labour they employ, shading into wage-and-salary payments, at one extreme, or travel and like expenses, at the other, and because employers are often the agents for the collection of contributions of their employees to social insurance and welfare schemes. Also, the records of industrial units may mix those various expenditures in one or a few summary accounts. To avoid the forementioned pitfalls, statistical authorities have found it essential to refer, in queries on the expenditures of employers for social insurance, welfare and like schemes, to specific types of payments that are required by law or by agreement between employers and employees in various industries. A number of countries have found it best to restrict the data sought to contributions that are legally required though this approach does not reveal all of the supplementary labour costs of employers. The type of

expenditures covered in various countries ranges from legally required contributions to governmental social insurance schemes to agreed, and even voluntary contributions to health, recreational, housing or deferred savings or profit-sharing schemes.

37. The experience of some countries indicates that the enterprise is more suitable than the establishment or an equivalent statistical unit, in gathering complete data on the contributions of employers to social insurance, pension, welfare and like schemes for their employees. This is the case because contributions to some of these schemes (e.g., for health, housing or recreation) are often made in a lump sum, without relation to or allocation for particular employees. On the other hand, the United States has successfully gathered those data for establishments; and a number of the countries seeking such data, particularly on legally required payments that are credited to individual employees or proportioned to the number of employees, have utilized the establishment for this purpose.

(b) Other Costs Except Industrial Costs

38. Data on the expenses of industrial units involved in purchases of non-industrial services, payments of indirect taxes, depreciation, etc., have been gathered to a much lesser extent than data on the expenditures of these units on fringe benefits for employees. This is the case in view of the greater difficulties involved in gathering the former kind of data and, perhaps, the less pressing requirements for those data. Among countries in South America, the number seeking data on costs other than labour or industrial costs has in fact declined. This may be due to attempts to cover expenditures other than those on labour and industrial costs in a catch-all query, "Other operating expenses", which many respondents left unanswered and which, in any case, yielded data of unknown coverage. On the other hand, all of the countries with centrally planned economies regularly gather annual data on the expenditures of industrial units for specified services of a non-industrial nature on depreciation, losses from bad debts and the like. The Netherlands gathers annual data on expenditures for all kinds of non-industrial services and on payments of

excise and property taxes. The Federal Republic of Germany and some of the Nordic countries have gathered such data, as well as figures of expenditures in repair and maintenance work and of depreciation, at less frequent but periodic intervals; the United Kingdom has sought figures of payments for transportation; and the United States has collected detailed data on expenditure for repair and maintenance and selected non-industrial services in a supplemental sample inquiry to the 1958 Census of Manufactures.

39. It is evident from the preceding that the range of expenses other than labour and industrial costs on which data are sought varies among countries. The countries with centrally planned economies have gathered detailed data on expenditures for each type of non-industrial service, depreciation, losses due to bad debts, capital losses, etc. - in other words, on the full range of items required to determine net profit or loss. The Federal Republic of Germany in its Survey of the Cost Structure of Non-Agricultural Enterprises and Norway in its Census of Non-Agricultural Establishments have limited themselves to those items that are required in compiling national accounts - i.e., cost of maintenance and repair work done by others, payments for transportation, communication, advertising and other non-industrial services, rents and interest paid, indirect taxes paid, and depreciation charged. The Netherlands does not seek data on depreciation in its annual industrial inquiry; and the United States, in its special sample survey, covered maintenance and repair expenditures, insurance premiums, taxes on real property and depreciation only. The United Kingdom inquiries in this field have been limited to payments for transportation services.

40. The experiences of the countries with market economies that have sought data on types of expenditures in addition to labour and industrial costs indicate the importance of clearly identifying the expenditures and expenses on which data are wanted and classifying and defining these items so that the most meaningful data for national accounting and other purposes will be gathered and, at the same time, respondents will find it feasible to furnish the data. The classifications and definitions that are designed to meet each of those objectives may not be consistent with one another; and compromises between the two may be required. Further, the Federal Republic of Germany and the Netherlands have found it necessary to utilize the enterprise in gathering data that go beyond labour and

industrial costs. Though Norway did seek such information for establishments, the United States may have excluded figures of expenditures such as for transportation, communication, advertising, from its sample survey because of the difficulties of obtaining these data for establishments. It may be necessary to gather information on expenditures for a number of non-industrial services for enterprises and allocate these expenditures among establishments, based on the statistical relationships between enterprises and establishments.

#### D. DISTINCTION OF SHIPMENTS OR SALES ACCORDING TO CLASS OF CUSTOMER

41. Some countries that utilize the establishment, kind-of-activity unit or similar sub-divisions of the enterprise in gathering data on the flow of commodities from the statistical unit or on services rendered by it have begun to draw distinctions between shipments to other sub-units of the same enterprise and those to other enterprises. Countries have made this distinction for two major purposes: (i) in order to distinguish sources of demand due to administrative decisions (i.e., from within the same enterprise) from sources of demand in the market; and (ii) in order to facilitate reporting of data on intra-enterprise transfers and comparisons between data on sales gathered for enterprises and data on shipments gathered for its sub-units. The Netherlands, for example, distinguishes intra-enterprise shipments in its annual inquiries; and the United States made this distinction in the 1958 Census of Manufactures and a supplementary inquiry into the distribution of sales by class of customer. The distinction has also been included in the international standards in basic industrial statistics and in the 1963 European programme in this field.

42. A number of countries separate data on shipments or sales into those for export and those for the domestic market in order to assess the significance of and variations in each of these sources of demand for the product of various industries. The Federal Republic of Germany, Ireland and the Netherlands have used this classification in data on sales or shipments in their regular industrial inquiries. In the United States, shipments for export were distinguished as part of the detailed classification of shipments described below. In addition to the usefulness of the distinction between shipments or sales for export and the domestic market for segregating these two sources of demand, the

distinction is valuable in using data on the flow of individual commodities out of industrial units, in estimating personal consumption expenditures or gross fixed capital formation and in assigning weights for wholesale price systems which distinguish between goods flowing abroad and goods consumed locally.

43. Detailed commodity data classified by type of customer are required for a number of purposes, such as for weights in sectorized wholesale price indexes and for other statistics measuring commodity flows. Such detailed information is also valuable in delineating the channels of distribution and the sources of demand for industrial products and facilitating use, in unduplicated estimates, of data on industrial units in conjunction with those on the distributive trades. The collection of such detailed data is a large task, both for the statistical authority and respondents, and can only be attempted at relatively infrequent intervals of time for purposes of obtaining structural information. The United States took such an inquiry as one of the supplementary sample surveys to the 1958 Census of Manufactures. The enterprise was utilized as the statistical unit in this inquiry. Data were sought for classes of products within each industry, except the apparel and publishing industries, classified according to the following eleven types of customers: company-owned sales branches, sales offices, and administrative offices; company-owned merchant wholesale establishments; all other wholesalers; other manufacturing plants of the same company (interplant transfers); all other manufacturers; company-owned retail stores; all other retailers; individuals (household users) and farmers; industrial, construction, institutional and commercial users and state and local governments; federal government; exports.

## IV. NEW OR IMPROVED MONTHLY AND QUARTERLY DATA

44. Monthly or quarterly data on industrial units play an important part in the figures sought by countries for purposes of watching current trends in the level of economic activity and pinpointing the areas in which fluctuations are occurring. For these purposes, countries have traditionally gathered information on the current output and employment and wages and salaries paid by industrial units, often for industrial establishments or similar units. For example, countries construct detailed index numbers of production, employment, man-hours worked and wages and salaries paid from such sources. In the countries with centrally planned economies, much more detailed data on these and other aspects of resources and activities of industrial units are gathered currently for purposes of measuring plan fulfilment and detecting problem areas. In a number of countries with relatively more industrialized market economies, in order to have anticipatory data as well as information on additional key aspects of the activities of industrial units, the traditional current series have been extended to cover items such as inventory held, current and anticipated capital expenditures, sales and orders. This has been the case, for example, in Canada, the Federal Republic of Germany, Japan, the Netherlands, some of the Nordic countries, the United Kingdom and the United States. These series, excepting capital expenditures, have usually been sought for the manufacturing industries and, to a lesser extent, for the other types of industrial activity. It has been common to seek current data on past and anticipated capital expenditures from all types of industrial units other than those engaged in construction.

45. Since timeliness of the data is essential in the series mentioned above, the enterprise or the kind-of-activity unit has usually been adopted as the statistical unit. To minimize the burden of collecting and compiling these data, reports are required either from the larger enterprises only or from the larger units and a sample of the smaller ones. Data on new and unfilled orders and sales are summarized frequently, even daily, by many enterprises so that there should be a minimum of delay between the close of the period and the time that they can be reported. Inventories are likely to take somewhat longer to compile. Consequently, in order to gather the various series as rapidly as possible, it has been found

worth while to separate the request for data on inventories from that on orders and sales. The data on actual and planned or anticipated capital expenditures have generally been gathered in a separate survey.

46. Since the enterprise has often been utilized as the statistical unit, the data gathered on sales generally relate to shipments of goods or services rendered to other enterprises. In some countries (e.g., the Federal Republic of Germany, the Netherlands and Norway), sales for export are distinguished from the domestic market. The data on orders also cover orders of goods by other enterprises. In fact, duplication would be introduced in those data if orders between establishments of the same enterprise were included. This would tend to limit the usefulness of the data as indicative of the level of demand. In the most expanded versions of the data sought on orders, figures are gathered of new orders received and orders filled during the month as well as orders outstanding at the end of the month. In abbreviated versions, data are gathered on new orders received and/or orders outstanding. Only total figures are sought to simplify reporting and compilation. In the case of inventories, however, separate figures are often sought on the value of inventories held in raw and other materials, fuels and the like, work-in-process and finished goods. Since the inventory data often relate to the enterprise as a whole, inventories are covered that are held at wholesale, and sometimes retail, outlets of the enterprise. The sales data frequently have the same wide coverage as the inventory data. The data gathered on capital expenditures, usually on a quarterly basis, call for sub-divisions of new expenditures into those on structures and other constructions and those on machinery and equipment. Some countries go much further in these classifications - for example, Canada utilizes a number of different categories for various kinds of structures, machinery and equipment.

## V. CONSTRUCTION

47. Despite the significance of the construction industry in the economy and the importance of having data on construction activity, the available data on construction enterprises and activity are, on the whole, less adequate in countries, other than those with centrally planned economies, than those for the mining, manufacturing or electricity or gas industries or output. This situation is due to a number of practical difficulties involved in identifying construction enterprises or gathering data on construction activity. Many of the construction enterprises are small contractors who are highly mobile and go in and out of business rather rapidly. They are, as a result, difficult to identify and locate for enumeration in addition to the fact that their records are often of a summary nature. The large construction enterprises are much easier to identify and locate, but the prevalence of sub-contracting and the rapid turnover and movement of labour and change of operating location make it difficult to gather data relating to their activities. Further, a significant part of construction is done on own account by public utility, manufacturing and other business units and even by private individuals, and these kinds of construction activities are often short-lived.

48. Despite the difficulties of identifying and enumerating contract construction units, a number of European countries have carried out annual or less frequent inquiries into the construction industry. The construction industry has been covered, for example, in the decennial Censuses of Non-Agricultural Establishments taken by the Federal Republic of Germany, the Netherlands and the Nordic countries. The use of field canvassing in these censuses, supplementing, in some instances, lists constructed from governmental administrative records, has been of considerable assistance in locating and identifying the construction units that should be enumerated. Restriction of the information sought in the Censuses of Non-Agricultural Establishments of the first two countries to relatively few items of data on the characteristics, employment and receipts of the units covered has also limited the task of enumerating the construction units located. However, the Censuses of Non-Agricultural Establishments taken by the Nordic countries have dealt with a wide range of items on the resources, inputs and



outputs of the establishments covered. This has also been the case for the German Survey of the Cost Structure of Non-Agricultural Enterprises or the annual Dutch Censuses of the Construction Industry. In order to gather data successfully on the inputs and outputs of construction units in those inquiries, it has been essential to formulate queries that take account of the prevalent sub-contracting and other practices peculiar to the construction industry. Canada, Ireland and the United Kingdom, which include the construction industry in annual production censuses, have also followed that practice. It should be noted that in the case of those three censuses, as well as the annual Dutch census, the construction units to be enumerated are identified from various records that are a by-product of governmental administration, including construction licences. In the case of some of these annual censuses it has been indicated that construction units were incompletely covered because of the inadequacies of the sources of lists and the rate of turnover among them.

49. In the countries with centrally planned economies, regular annual, quarterly and monthly inquiries are taken into contract construction and ancillary construction units. These investigations yield data on the use of resources (e.g., labour, equipment, etc.) and input and output for construction units which are about as ample as the data gathered for industrial enterprises. The data obtained in the inquiries into construction units also furnish information on the value and volume of construction work done during a period (e.g., month or year), of construction completed during the period, and of construction in progress at the beginning and end of the period.

50. Whether or not they take inquiries into the construction industry, countries other than those with centrally planned economies find it essential to take independent annual and more frequent surveys of construction activity. This is the case because of the numerous requirements for current data on the amount of construction work being done and on construction starts and completions and the significant amount of construction done under auspices other than that of identifiable construction enterprises. The annual and more frequent surveys of construction activity are typically based on building licences required by law or local regulations, supplemented, in some cases, by inquiries into the

completeness and adequacy of the system of permits. Another source of current data on the value of construction work available to a number of countries is their annual and quarterly surveys of capital expenditures. Canada utilizes the two bases for information on construction activity in conjunction with one another. Canada also relates its annual census of the construction industry to these surveys of construction activity. Most countries do not seem to follow such a practice.

51. The legal provisions requiring a permit or licence to undertake construction vary both within a country and between countries. In the Netherlands, for example, construction amounting to 2,000 guilders or less can be charged to current account and a licence is not needed, unless the construction is undertaken by a corporation or the Department of Public Works. Repairs often can be made without such a permit, although the repairs may be extensive enough to change the basic character of a structure. How uniformly licensing regulations are enforced is difficult to determine even for a single municipality. Lax enforcement may result either in some construction without a permit or give rise to a discrepancy between the time when construction is started and the time when a permit is obtained. Strict enforcement may result in the inclusion of minor repair work. Moreover, the act of obtaining a permit often does not ensure either that construction will be started or if once started, that the construction will ever be completed. Further, the information given in permits is at best an estimate of the value of the construction to be undertaken.

52. Where permits are a principal source of information regarding construction, specific effort usually is required to ascertain their coverage and their relationship to the time the permitted construction is actually started and completed.

53. To obtain data on the coverage of permits, the United States matched construction observed by enumerators with permit records. The discrepancies found were difficult to interpret since they were soon corrected and it could not be ascertained whether the correction was the result of the inquiry or because it is usual to start work and obtain a permit later. In another effort to check the coverage of permits, the United States in 1959 experimented with the use of

aerial photographs. The sample areas, chosen by probability methods, were flown over twice (once as near the beginning of the month and again as near the end of the month as weather would permit) and aerial photographs were obtained. These were then interpreted and notations made of work under construction, work started during the month, and work completed during the month. A subsequent examination of the area, made by enumerators on the ground, showed that the quick interpretation accorded the photographs had failed to recognize some construction work, for example, after the roof was in place and the surroundings had been partially cleaned. The experiment was soon discontinued for economy reasons and its potentialities have not as yet been fully evaluated.

54. Canada, the Federal Republic of Germany, Finland, Japan, the Netherlands, and the United States, among others, ascertain for each permit when work is started. Information may be obtained at that time, or verified, on the type, purpose, estimated building costs per cubic metre, size (square metres of floor space), number of dwelling units, method of financing, materials used, whether it is prefabricated or conventional construction, etc. Finland, the Netherlands, and Japan make quarterly inquiries on the progress of the construction, either in value or physical terms, for all but minimum-sized undertakings. A similar monthly survey has been started in the United States for a sample of non-residential construction projects to obtain estimates of the value of work put-in-place during the month, though results are not expected to be published before mid-1962. Such progress reports often will reflect completions. Completions may be made the subject of a separate survey, as they are in the Federal Republic of Germany and Japan.

55. In Canada, the difficulty of trying to find a suitable respondent to provide information on residential houses completed during the month led to the adoption of the measure, "new dwelling first occupied", since the occupant could be located more readily than the builder. A by-product of this measure is information on the number of units "apparently completed but unoccupied". In the United States, a survey started in early 1962 adopted "new home sales" as an appropriate measure, partly because most new homes are sold before they are completed and partly because the sale price usually reflects market value.

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56. Expenditures on the repair and maintenance of non-residential structures are usually obtained from the business units occupying them. Until recently, similar data usually were not available for residential structures. Recently, both the United Kingdom and the United States have initiated periodic household surveys to obtain this information. The quarterly survey in the United States is based on an area sample of approximately 2,500 dwelling units. From owners, enumerators obtain data on expenditures by type of work done (repair, renovation, redecorating, replacement, or expansion) and by source (contractor, service industry, force account, or do-it-yourself). Renters are asked to report the expenditures they have made on the rental property they occupy and also for the name and address of the owner or his agent. The owner or agent of the rental property is then requested by mail to report his expenditures for repair and maintenance. The dwelling unit, whether owner-occupied or rented, can be selected with a known probability. When the dwelling unit selected is located in a multi-unit structure and rented, it has been found that the owner may be unable to report repair and maintenance expenditures for a single unit, but only for the entire structure, and this requires the appropriate weighting of the expenditures to reflect the probability of selecting the multi-unit dwelling.

## VI. EXTENSIONS IN TABULATIONS

57. During the decade, electronic data processing techniques have been introduced in the statistical agencies of a number of countries. The capability of electronic equipment rapidly and accurately to construct and compare totals of specified items, to compute ratios, and to prepare frequency distributions of the totals or ratios has greatly expanded the opportunity to construct new and more penetrating tabulations of the industrial data gathered. Similar tabulations can be prepared by hand or punch-card methods, of course, but usually they are expensive and all too often available resources are strained to complete a minimum of the basic tabulations in good time. Nevertheless, where ratios of the totals of selected items are held of sufficient importance, as is the case of specialization ratios, frequency distributions of these ratios are prepared and published without electronic equipment.

58. The use of electronic equipment to check the internal consistency of the data reported, as well as to tabulate the data, requires the computation of many totals and ratios for the individual establishments or other tabulating units. When these computed totals and ratios are spread into frequency distributions and published for industries or other categories, the resulting tabulations provide a means of analysing the reliability of the data gathered, the validity of the classificatory system utilized, and many structural aspects of the economy. Preliminary tabulations, prepared for purposes of reviewing the data for an entire industry before publication, often contain many of these elements. Special tabulations prepared for analysts have also embodied this type of information.

59. As a part of the 1958 Censuses, the United States has prepared for general publication a set of analytical tables of that type. These tables show frequency distributions of the number of establishments according to such items as (i) the ratio of cost of materials to value added (seven classes) classified by four-digit industries and size of establishment (seven employment classes) and by kind of industry and specialization ratio (six classes), (ii) value added per employee (six classes) classified by four-digit industries and size of establishment, and (iii) average hourly earnings of operatives (seven classes) classified by four-digit industries and nine geographic divisions. Perhaps of even greater interest are the

special tabulations being prepared at the United States Census Bureau in which the data reported by particular establishments over spans of five to seven years are tabulated simultaneously and/or cumulatively. Such historical records for each establishment afford an opportunity to study frequency distributions of the change over time in a characteristic of the establishments or of the change in one item (e.g., the specialization ratio or value added) associated with the change in another item (e.g., hourly earnings or the ratio of cost of materials to value added). Such tabulations represent an exploitation of industrial statistics that would not have been possible a decade ago. These tabulations add a time dimension that cannot be extracted from a series of independently tabulated surveys. The tabulations preserve in effective form nearly all of the variance that is present in the individual establishment reports, while preserving the confidentiality of the individual reports.

## VII. CONCLUSION

60. This study indicates that a number of countries face rather similar problems in devising adequate and practical systems of industrial statistics - for example, with regard to the choice of appropriate statistical and tabulating units or gathering the desired data on the construction industry and activities. The study also points to areas of industrial statistics where significant experiments are being conducted and progress is being made in extending and improving the supply of available industrial statistics - for example, in the case of figures of the stock of fixed assets, of current and forward-looking data on industrial activity, or the use of frequency distributions in tabulating industrial data.

61. The Commission may therefore wish to keep under review future developments in a number of the areas of industrial statistics dealt with in this paper. In particular, as is mentioned in the paper, "The Systems of Industrial Statistics of Five Highly Industrialized Countries (E/CN.3/285), which is also being considered at the twelfth session, the Commission may wish to request that the Secretary-General:

- (i) Continue to study the question of the appropriate statistical and tabulating unit to be utilized in gathering and compiling industrial statistics under various circumstances, the concepts and methods for gathering data on all elements of the cost of production of industrial units, and approaches to and techniques for valuing the stock of industrial fixed assets.
- (ii) Prepare a detailed study of the problems of and suitable concept methods and techniques for gathering data on the construction industry and construction activities, with the aid of experts and through consultations with countries and regional statistical organizations, where appropriate.
- (iii) Prepare a programme of current (monthly or quarterly) industrial statistics for consideration by the Commission with a view to complementing the recommendations of the Commission on annual and less frequent industrial statistics.

The Commission may also wish to indicate other aspects of industrial statistics which should be kept under intensive review.