ARTIKLER 16

LONG-RANGE PLANNING, PROGRESS- AND COST-REPORTING IN THE CENTRAL BUREAU OF STATISTICS OF NORWAY

By Svein Nordbotten

LANGTIDSPROGRAMMERING, FRAMDRIFTS- OG KOSTNADSRAPPORTERING I STATISTISK SENTRALBYRÅ

OSLO 1966

STATISTISK SENTRALBYRÅ

ARTIKLER FRA STATISTISK SENTRALBYRÅ NR. 16

SÆRTRYKK FRA STATISTISK TIDSKRIFT 1966:1

LONG-RANGE PLANNING, PROGRESS- AND COST-REPORTING IN THE CENTRAL BUREAU OF STATISTICS OF NORWAY

By Svein Nordbotten

LANGTIDSPROGRAMMERING, FRAMDRIFTS- OG KOSTNADSRAPPORTERING I STATISTISK SENTRALBYRÅ

OSLO 1966

ARTIKLER FRA STATISTISK SENTRALBYRÅ NR. 16

SÆRTRYKK FRA STATISTISK TIDSKRIFT 1966: 1

Long-range planning, progress- and cost-reporting in the Central bureau of statistics of Norway[1]

by Svein Nordbotten

1. Objectives and conditions

As most firms and agencies, a statistical office has an administrative need for measuring and describing its own activities in different ways to predict future needs for resources, allocate resources and control efficiency. Measuring and describing the activities in a statistical office turns out not to be without problems and had not been advanced beyond the financial accounting until recently in most offices.

Even though any management should be interested in developing such tools, there are certain additional conditions making such a system almost necessary for the management of the Central bureau of statistics of Norway. The Bureau has to prepare and pass over its budget proposal to the Ministry of Finance about one year ahead of the start of the annual budget termin. The Ministry of Finance requires explanation for any change from last year, asks also frequently about future budget implications, and may compare present statements with those given previously, before the budget is included, possibly revised, in the Government's proposal to the Parliament.

These conditions make it a necessity to make up plans far in advance for any major project in order to obtain estimates of future needs for resources. The Ministry of Finance, the Parliament as well as the general public also like to know what they can expect to receive in return for the resources. It is the concern of the Bureau to inform the public about its general plans and later to produce results which satisfy the expectations of its sponsors.

In the Norwegian Bureau we therefore felt we had a need for a system which indicates both the inputs and outputs of our activities in such a manner that it could be used to construct satisfactory plans as well as controlling and comparing the current progress with the stipulated plans in order to take corrective measures as fast as possible.

The work on this system started more than ten years ago with the introduction of a general work reporting system by which it was possible to estimate how the labor input really was distributed on different categories of work, on different statistical subjects and on different stages within each project. Later, about five years ago, this system was extended and consolidated with the equipment utilization reports which so far had been kept separated and supplemented with data from our financial accounting system to one, in principle, complete cost accounting system which was computer processed.

All the time, it had been recognized that even though this system gave a lot

[1] This paper was prepared during a study in USA as a Rockefeller Foundation Fellow in 1963/64.

of valuable information, such as complete cost and physical inputs for specified projects or operations, it only told half of the story. It had for some time been the policy of the Director to prepare a policy program for the Bureau every five years. At the beginning of 1963 it was just time for starting to work on the next plan for 1965—1969 and the Director decided that this should give more quantitative formulated statements than the previous hoping that increased emphasize on this aspect would give a more realistic and valuable program. Work was therefore started to develop a system in which both the input and the output of the statistical activities was expressed in meaningful terms, to develop procedures to measure on a current basis the values of these additional characteristics and to make use of the recorded information in predicting future efforts and results.

Previous experience had proved the five-year policy programs to be of great importance to the Director in promoting the Bureau's policy, but the usefulness decreased substantially when approaching the last part of the program since so much additional information was then available that the program was more or less out of date. This did not imply that a five-year period is a too long period, but rather that the planning process should be continuous with a five-year horizon which was also decided.

A system as outlined above was implemented during 1963 and the first five-year program expressed in quantitative terms was obtained for 1964—1968, linking it together with the last five-year program prepared for 1960—1964.

2. Concepts for description of the statistical activities

2.1. Activities

Before proceeding to the system description, it will be useful to discuss certain concepts which the system is built on. The smallest activity we measure is the operation within a project, called project-operation. The Bureau's activity is divided in some hundred projects, corresponding roughly to a specification defining jobs as the Monthly foreign trade statistics, the Annual agricultural survey, *etc.*, as projects. In addition to the so-called end projects with statistical results published, there are several others, called dummy projects, such as certain types of internal service activities, research in methodology, general administration, *etc.* Each project is given a four-digit classification code such that the two first digits describe its general field, *i.e.*, Economic statistics, Agriculture statistics, and so on.

Each activity is subdivided into operations, such as planning, project management, data collection, data transmission, editing, tabulation, *etc.*, and denoted by a two-digit code. The first digit is standardized for all projects while the meaning of the second digit may differ from one project to another and is therefore never used above project level.

In the time dimension the month is the general time period used, but the monthly measurements are frequently consolidated to quarters and annual periods.

2.2. Inputs and outputs

The projects are characterized by their inputs and outputs in the different periods. The different kinds of inputs are classified in main categories as labor, stationary, office equipment, processing equipment, office space, *etc.* and each main category is divided into subcategories if they are not considered sufficiently homogenous. The labor category is, for example, broken down into labor of different salary grades, stationary is broken into stationary for clerical operations and for machine operations while processing equipment is divided by the type of machine used.

The inputs are basically measured in physical units. The labor input is for example, measured in number of manhours and obtained from each employee except for some higher administrative personnel. Each employee is supposed to report daily how his or her working hours have been spent on projects and operations. The reports are collected once a month for processing.

Stationary, for example punched cards and magnetic tape, is naturally measured in number of cards, tapes, *etc.*, while machine utilization is expressed in machine-hours spent on each project and operation. More difficult to measure is the use each project-operation makes of the office space, general services as telephone operation, reception, administration, *etc.* These are just allocated to divisions according to the space or labor resources allocated to them and then distributed further to project-operations.

By means of the cost concept each project-operation is made compatible with the others. The cost of a project-operation is obtained by multiplying each input measurement with its unit cost price including all direct as well as computed costs and adding all components. In the Central bureau of statistics of Norway, we have found that a statistical product may be meaningfully described by its number of details, its accuracy, its actuality and its frequency. Before describing these concepts in detail, we observe that they are dependent at least by the resource restrictions since by a given input, we are unable to increase one of these characteristics without a decrease in one ore more of the others as long as the production conditions are the same. We should also note that statistical masses often grow, the consequence of which is that subject to no change in the production conditions and resource allocation, one or more of the characteristics of the output must diminish. The following definitions must be considered as tentative approximations rather than final conclusions.

The number of details of the output of a project in a given period, is the number of table cells with information made available for consumers of the statistics. This definition is rather rough since no distinction is made between more and less intensively prepared tables. A table of subtotals in a two-way distribution table should perhaps be given a different weight as to the number of details than a corresponding table of the standard deviations of the characteristic within the same classification.

In our measurements we are simplifying even more and counting the num-

ber of pages published as an indicator of the number of details. Of course, one page Trade statistics is quite different from one page Health statistics, but we still think we get something useful because most comparisons comprising this characteristic are on an intra-project rather than an inter-project basis.

By the accuracy of the output from a project we mean an inverse expression of the difference between the statistic obtained and the value of the characteristic which the statistical users really need. If we shall hope to obtain anything measurable, we shall have to simplify and make the definition operational as well as a procedure to weight the accuracy measurements of the individual statistics of a project to a general expression of the overall accuracy of the output. Without wasting any more time on this very interesting characteristic, I should say that this characteristic is the only output characteristic we have not attempted to measure objectively and which we substitute by subjective judgment. It must, however, be an important aim to implement also a measure for this characteristic in the system.

The actuality of a statistical output is defined as an inverse expression of the time between the moment at which the output is available for the statistical users, and the point of time or the end of the period to which the statistics refer. The measurement of this characteristic does not present any serious problems.

The last characteristic we feel important is the frequency of the statistics considered. The frequency is an inverse measure of the time between this and the last collection of similar statistics. There is often a certain relationship between frequency and actuality. With low actuality, *i.e.*, long processing time, the frequency has to be high if the users have a given actuality requirement because each statistical set of figures is already rather out-of-date when they are presented and soon requires to be substituted. The users of statistics will, for example, be more or at least equally up-to-date with a bimonthly statistics with one month actuality as with monthly statistics with two months actuality.

To measure and describe the frequencies of the different projects, is no problem and is mentioned here because the role it plays together with the other characteristics is often overlooked.

At the input side, we had the cost concept as a useful way to make the different inputs compatible. We can imagine a similiar set of preference prices for the output characteristic possibly derived from a market study of the needs and uses of statistics. Since a statistical office in some respects may be considered as a monopolistic agency for statistical information collection and distribution, it may be more useful to think about preference price functions depending on the respective characteristics. Decisions about the projects formulation have been and are currently made, indicating that in some way, it should be possible to describe the basis for decisions by some kind of preference prices. But we are still wondering how these prices are generated, in which way we use them and how to measure them. The present system

does therefore not include any preference prices and evaluation by means of them.

3. A system for planning, progress- and cost-reporting

The use of the above described concepts is perhaps best described by starting with the planning and ending with the source of the information even though this may seem to be an illogical approach.

In the fall each Division is requested to revise, cut out and/or extend the five-year program determined last year. This means that the Division has to give the number of man-hours, and machine-hours in the case of the operating Division, for each quarter for the two next years specified by type of labor and machines for each project. For the three following years the specifications are only required for each year. The information available to the Divisions is the last and previous years' reports on performed activities compared with planned. The subject-matter divisions are further required to list by projects the number of tablepages they expect to turn out and in which periods. This gives the management of the Bureau some rough indications as to planned details of products, actuality and frequency. To cover also accuracy, the Divisions are asked to supply information if they expect to increase or decrease the accuracy compared with similar, previous projects. This is of course a very difficult task particularly for the operating Division which usually has only fragmentary specifications at this stage. We feel, however, that this is much better than pure, passive guessing because it forces all available information into a system. These proposed plans are received and evaulated by the Director. Any changes in the plans for the first year has to be within the frame of the budget already approved by the Parliament, while changes for later years must be in correspondence with the Bureau's overall policy. After discussions with each Division, the Director determines the plans which are not, except for emergencies, changed until next year.

Based on this main program, the divisions continue their detailed planning. The Division for administration starts to work on the second year's plans to build up a budget proposal consulting the respective Divisions when necessary. The central, service divisions break down the first years plan into monthly time schedules making appointments with the subject-matter Divisions about acceptance and delivery dates for job specifications, data and results. This monthly time schedule also shows the allocation of the labor resources to different projects. Similar monthly schedules are also worked out by some subject-matter Divisions.

In the Machine operating division, there exists a still lower level plan for each week specified for shift and project. This plan is worked out immediately before the start of each week and includes also a machine allocation schedule.

All the plans described above are punched and processed by a computer together with reports on work done and results obtained to form progress reports. Before describing the content

and use of the progress reports, we turn to the reporting part of the system.

Every day each employee is supposed to fill out his reporting form recording how he has spent his time on project operations. The employees of the Machine operating division must also report machine units they have used and when. This information is supplemented by the information from the log-books of the more important equipment. The reports from the subject-matter Divisions are collected once a month, screened for completeness, punched, sorted by Division, project and operation, and listed for confirmation and use of the head of each Division. The information allows control of each operation and individual employee's contribution to the project-operations.

The reports of the Machine operating divisions are punched every week together with the information from the log-books to provide data which are compared with the week's plan and printed out in a way convenient to make processing plans for the next week. Of course, the daily schedule is further elaborated by the shift supervisors to obtain the best utilization of both employees and equipment.

The Division for administration reports on the dates and extent of publications released. All reports are processed each quarter and compared with the plans. The progress reports will therefore give information by Division for each project about planned and actual input as well as output for the last quarter and totals so far. The progress reports may also be selective and only give information about critical projects for which the absolute or relative deviation between planned and actual figures exceeds a certain limit.

The progress reports and the statistics mentioned are distributed to the top management of the Bureau and the chiefs of each Division each quarter. The progress reports should therefore, not only be a control tool for the top management. It forces the Division chiefs to take an overall look at each survey or census as a project and spend more time on the planning and evaluation of the later stages than would otherwise be done. It also gives the chiefs a possibility to explain the reasons for deviations between planned and actual achievements which otherwise might have been misinterpreted as results of bad management, *etc.*

The last part of the system is the cost analysis which is performed on an annual basis. In addition to the inputs already reported, the Division for administration also reports on the overhead costs. At the end of each year each input for the whole year is converted to money value by means of the cost prices computed from values obtained from the financial accounts. Those inputs which are not already allocated directly to a so-called end project-operation, are distributed to such by a rather complicated multistage distribution scheme. After the distribution phase, tabulations are done giving the cost of each end project by operation, by input category, *etc.* In the long run, the cost should of course equal expenses taking amortizations into account.

The cost tables are of particular interest to the management in deciding

how to select and give projects the least overall dimension. They are also useful for the Division of administration and the other Divisions when working on the budget proposal or planning new surveys.

4. Implementation of the system

The system as described above is now implemented and in working order. Some parts of it are, however, not given in their final form since we do not think we have general enough experience. The part which is most preliminary is the one producing progress reports. We are not yet sure which is the most useful form and specification of these reports. Another part is the maintenance of the files of planned and actual figures for inputs and outputs which of course is depending very much on how we determine the format of the progress reports.

Even though some are preliminary, we have computer programs taking care of the processing of the described features of the system.

5. Future improvement

The most obvious defect of the system, is the lack of a proper definition and indicator of the accuracy of a project result. The accuracy is probably the most invariant characteristic since the same pattern of collection and processing is followed in repeative surveys even though the number and type of questions may have changed and it is probably the actuality characteristic which has been determined residually. We may perhaps suspect that at least in some cases we are exaggerating the accuracy requirement on behalf of actuality, and detailed break-downs, but to confirm our suspicion we shall need an accuracy measure.

A frequently forgotten factor when considering a new project proposal is the efforts we require from the respondents. These may be substantial in collection by mail which is the most common way of data collection in Norway. Statisticians always remember to count the advantage the public will have from the results of a project, but we are not always considering this advantage in relation to the disadvantage for many respondents who will never make any use of the prepared statistics. In some way the input of the respondents should be measured and included among the input factors of each project.

Assuming that also the respondent's input can be made compatible with other inputs by some cost price, we are left with the most difficult problem of preference prices. If the characteristics of the different projects could be expressed in money terms reflecting the social utilities of the statistics by means of some preference price functions, the problem of constructing an optimum, statistical policy program would be reduced to a computational problem. The problem of constructing such a set of preference price functions, may perhaps be simplified by considering a solution in three steps. First, each project may be considered separately and relative weight functions constructed for each of the four output characteristics. Then all projects are considered and assigned with relative weights. The third step would be to compare cost and total output and give the latter a weight making it compatible with the cost. However, it is likely that a realistic solution is much more complex, and we shall have an interesting theoretical problem with a very difficult practical counterpart.

KUNGL. BOKTR. STHLM 1966

Publikasjonen utgis i kommisjon hos
H. Aschehoug & Co., Oslo, og er til salgs hos alle bokhandlere

Pris kr. 4,00

Omslag trykt hos Grøndahl & Søn, Oslo
For øvrig trykt hos P. A. Norstedt & Søner, Stockholm