

Statistics Norway

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Quality issues in Statistics Norway

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1. Introduction

Statistics Norway has like other National Statistical Institutes (NSIs) been working on quality issues for many years. The traditional focus has been on the final quality of our products, for example on avoiding errors in tables and publications and on improving the accuracy of estimates expressed as sampling errors if applicable. However, over the last years our quality concept has been getting gradually more comprehensive. In particular, relevance and accessibility for users have got a clearer focus. Recently, Statistics Norway has started a systematic quality work encompassing all products and processes.

The paper considers some quality issues that have been given special attention in Statistics Norway during the past few years, or areas where we, to some extent, do things differently compared to most other NSIs.

In former days, our main products were publications that were designed to satisfy in particular the needs of users within planning and research. But during the last 10 years we have gradually changed our dissemination policy towards meeting the needs of a broader public, as well as targeting more specialised users. This change has been facilitated by the development of new technology, i.e. the Internet. Today all official Norwegian statistics are disseminated for free by the Internet, and it is an objective to reach the general public directly or via different public media. For this purpose we have actively recruited journalists to work within Statistics Norway. User orientation and dissemination is one of the quality issues considered in this paper.

Our work on documentation includes a system of systematic description of statistics on our web-service. Several aspects of quality linked to each statistic are described here. This system is briefly presented.

Statistics Norway is one of few Statistical Institutes that has a relatively large research department. Hence, we will focus on the importance of our own research activity for maintaining and improving quality of statistics.

The management of quality issues should be closely linked to the overall system for management and reporting. There is an increasing focus on indicators for measuring overall performance both for internal reporting and follow up, as well as for external reporting. Such indicators are aggregated quality indicators. Some experiences with performance indicators in Statistics Norway will be reported.

The paper sums up the status of our systematic quality work. There is a need for continuous improvements in user satisfaction, product quality and work efficiency, also due to international requirements, cuts in governmental grants and increased market funding and competition. The work is based on a broad quality concept with user needs as the point of departure for defining and evaluating quality of products and processes (box 2). It should be noted that quality indicators can refer to different levels, ranging from characteristics of a single number (for example its accuracy) on the most detailed level up to performance indicators covering the NSI or even a statistical system like the European on the most aggregated level.

So far we have little experience in studying processes and their quality which will be an important aspect of the systematic quality approach. The area of the Consumer Price Index (CPI) is an exception. The quality work on the CPI is briefly described at the end of the paper.

2. User orientation

The process of changing our dissemination policy to reach a broader group of users started about 10 years ago. We harmonised all our publications based on a new profile, and started to publish new statistics in "Statistics weekly" in addition to our traditional publication series. Our first journalist was recruited to edit this weekly publication, where emphasis was put on presenting statistics in a more user-friendly way seen from a non-expert point of view. Of course this led to some internal conflicts between popularisation and a more 'pure' statistical way of presentation. But there is no doubt that Statistics Norway gained a reputation of being more up-to-date and that our statistics reached a broader public than before, also because the media spread more of our statistics. This development was boosted by the development of the Internet. Statistics Norway was one of the first NSIs with a web-service when we started in February 1995. Internet is today our main channel for dissemination of statistics. Several new statistics are released daily ("Statistics daily" has replaced "Statistics weekly" even if we make a weekly summary). Headings and ingress are written by journalists in co-operation with the responsible statisticians. All new publications are also released on our Web site and can be downloaded from the Internet. New statistics are released according to a pre-release calendar. Statistics Norway's web service is free of charge.

We have just opened a service where users can select statistics directly from our databases on Internet. It is believed that this in particular will benefit professional users.

Main statistical news and some other services from our web-site are also available on mobile telephone (WAP = Wireless Application Protocol). The number of hits on our Internet-service is now about 2,5 millions per month. It has typically increased by 50 percent annually.

A major issue when discussing quality and dissemination is how to measure and take user needs into account. Users have different needs that might be in contradiction. For statistics or analyses covered by a large governmental grant there is a need for extensive user contacts and also user studies and surveys to ensure that our priorities are in accordance with the needs. It is often believed that the degree of customer satisfaction is measured automatically when the demand for statistics is decided in a free market. Today NSIs are partly financed by the market. Statistics Norway gets about 25 percent of its income from projects paid directly by the customers. However, often these customers are public institutions that demand statistics on behalf of other public bodies such as the municipalities or the general public. Hence, even when statistics are financed in the market there is a need for more information about the users and customers than just who is buying what.

On the other hand, customer views cannot always be taken into account. The contradictory nature of different user or customer needs is one thing; another is the need to ensure consistent and coherent statistics that can be compared over time and geography. It can for instance be observed that many users tend to give priority to timeliness, whereas it might be difficult for them to appreciate aspects related to international comparability or evaluate the basic reliability of the figures. This makes it necessary for a NSI to follow its own agenda to some extent. In fact, a main reason to have one national statistical institution with a considerable degree of governmental funding, and a statistical act giving it an exclusive right to collect statistical data by law, is to ensure the implementation and maintenance of one coherent statistical system following international definitions and standards.

We have done some work to balance different user needs in Statistics Norway. As mentioned, there is no doubt that the general public knows more about our statistics now than some years ago, and frequent contacts with expert users and our market activities make us sure that we know something about their needs. Several advisory groups representing users provide valuable guidance to our work.

However, private sector and in particular the industrial sector has not been satisfactorily represented among our advisers, and comparisons with other countries also indicate a potential for increased use of our statistics in this sector. We have therefore taken steps to improve our services to the industrial sector. Enterprises are important data suppliers as well, and it is important that they see the usefulness of providing data that provide input for the production of statistics. One successful example that could be mentioned is a recent project where enterprises after having submitted data on their energy use, get feedback with their own figures compared to key (average) figures for their industry. Feedback to data providers, including statistics, is an important issue in connection with the development of electronic data collection (also through the Internet). Statistics Norway works on such data collection projects both in the public (municipalities) and the private sector. The industrial sector will in general demand quite detailed statistics, for benchmarking and market analyses. These needs have to be balanced against protection of privacy and data quality.

The assumption of increased availability and use of statistics in general through Internet is supported by evidence from different sources. Examples are statistics on the number of quotations in major newspapers and other media, statistics on telephone calls and E-mails to our library and information service in addition to web-statistics. However, we have not carried out systematic user surveys and we do not have satisfactory customer databases. Hence, our knowledge about our customers could be improved.

What we have done is to participate in a general survey measuring public confidence in different institutions, both in public and private sector. This survey which is carried out by a private survey institute, shows that Statistics Norway is one of the institutions with the highest score; only the police and the public institution for defending consumer rights are ranked higher. In total 82 percent of people that express their view have great or very great confidence in our statistics. Last year we have also carried out a small study among the customers who have paid for statistics or work in Statistics Norway. These are in general satisfied (about 80 percent). What they are less satisfied with is the timeliness of statistics. However, these surveys only give some indications, and a more systematic approach to user needs, including user surveys will be considered in connection with our systematic quality work.

3. Documentation

Documentation is an important element of quality management. A lot work has been done on documentation in Statistics Norway during the last years, including documentation of data, systems and completed statistics. Still we have a long way to go to have a satisfactory documentation of all our data. However, one major achievement last year has been a systematic description of statistics on our web-service. The documentation follows a set up that is more or less common in several countries such as Sweden and Denmark. In Statistics Norway this documentation is linked to all statistics included in our release calendar on Internet (about 300 statistics). The items to be documented are listed in box 1.

Descriptions vary in coverage, level of detail and length. In some cases items are not filled in because they are not relevant (as sampling errors in a census or in register statistics), but also because we do not know for example the uncertainty (but it is useful to know that we do not know). Descriptions vary from a couple of pages for some statistics to 20 pages or more. One issue is if this documentation is what the users want or need. It is believed that it is most useful for expert users, but it might be too technical for the media and the general public. There is a need for a harmonisation of the forms and also for a general quality control of the descriptions. This will be carried out as a quality project. At the same time we will consider simplifying the descriptions, possibly on the top level, and have a more detailed description for expert users linked to it and other and more comprehensive documentation such as methodological and technical reports, statistical standards and classifications. The possibility of differentiating between user groups by linking several levels of information is one of the most striking features of the web.

Box 1. About the statistics

1. Administrative information

- 1.1. Name
- 1.2. Subject group
- 1.3. Frequency
- 1.4. Regional level
- 1.5. Responsible division
- 1.6. Authority
- 1.7. EU regulation (if relevant)

2. Background and purpose

- 2.1. Purpose and history
- 2.2. Users and applications

3. Statistics production

- 3.1. Population
- 3.2. Data sources
- 3.3. Sampling
- 3.4. Collection of data
- 3.5. Response burden
- 3.6. Control and revision
- 3.7. Analysis

4. Concepts, variables and classifications

- 4.1. Definition of the main concepts
- 4.2. Definition of the main variables
- 4.3. Standard classifications

5. Sources of error and uncertainty

- 5.1. Collection and processing errors
- 5.2. Sampling errors
- 5.3. Non-sampling errors

6. Comparability and coherence

- 6.1. Spatial comparability and comparability over time
- 6.2. Coherence

7. Availability

- 7.1. Internet address
- 7.2. Language (Version of Norwegian, English)
- 7.3. Publications
- 7.4. Storing and use of basic material
- 7.5. Other documentation

4. Analytical frameworks and the quality of statistics

It is often argued that the main users of statistics include the National Statistical Institutes themselves. This should especially be the case in Statistics Norway, which has a long tradition for integrating statistical production with research and model building, based on national accounts. Certainly, several aspects of quality can only be evaluated when the figures are analysed within a systematic framework. Analytical frameworks such as the national accounts and economic and socio-demographic models are considered essential to ensure quality related to the following aspects:

- Relevance
- Accuracy
- Comparability and coherence

The point can be illustrated by the following situation when you have - as in Statistics Norway - an econometric macro model closely integrated with national accounts (NA): By using historical time series from NA the parameters of the model are estimated. Over time one will observe residuals between the results of model estimates and the observations, and we will acquire knowledge about the structure of residuals. The residuals can follow different patterns:

- 1) The dispersion of the residuals looks plausible according to previous experiences.
- 2) The residuals appear to develop according to a trend.
- 3) The residuals are systematically positive or negative.

In situations 2) and 3) we will have to consider whether there is a new situation not caught by the model, for instance missing variables, or if there is something wrong with the data. The model will be of great use to understand relationships and detect possibly erroneous or missing data.

Example: The base year for an index was changed without knowledge of those responsible for quarterly national accounts. When the new index figures were put into the model, this led to a considerable price effect that at first glance was considered to be due to random fluctuations ('noise'). However, when more data were put into the model, the disturbances became so important that a more detailed review of the base data had to be made - and the national accounts were corrected (situation 3). This case underlines the importance of documentation, since the problem might have been avoided if the index had been accompanied with proper metadata.

In general, co-operation and common frameworks and tools are important for quality assurance in an institution. The quarterly national accounts model was for example developed in close co-operation between experts on econometric models and national accounts. It was developed based on a common framework as previous econometric models. There is shared expertise on the model tools and a good possibility to ensure high quality of updating and maintenance of the quarterly accounts model - as well as other models.

On the other hand, internal users of statistics like our researchers provide support but do not guarantee for quality assurance. The Research Department and analytic activities in Statistics Norway does not cover all subject matter areas where we produce statistics, and there are always potentials for improving co-operation and the increasing use of analytical work in the whole organisation. Breaking down barriers between departments and activities is also an issue in our systematic quality approach.

5. Performance indicators and quality

As mentioned, quality issues related to statistics can be studied on different levels, and the importance of different quality dimensions can vary according to level. Relevance and accuracy can for instance have most meaning on survey level (or for specific figures), whereas coherence, cost efficiency and independence/neutrality can have more meaning at system or institutional level.

Performance indicators are based on a systematic measurement of the performance of different parts of the organisation with monitoring of resource usage and volume and quality of output. Ideally, performance indicators should be able monitor quality aspects both at detailed level and at institutional level.

Statistics Norway has for about 40 years been working on systems for a fairly detailed registration of resource usage linked to different operations and subject areas. Over the last years there has been increased focus on measuring a broader range of indicators telling more about efficiency, including response burden and product and process quality, such as production time, response rates etc.

For the moment it is possible to produce the following performance indicators on the basis of the planning system:

- Timeliness or production period (period between reference date and release date)
- Punctuality (if actual release time is in accordance with announced release)
- Response rate
- Response burden (estimation of hours spent by respondents)
- Resources used (hours/costs) per product

In order to assess efficiency it is necessary to get some estimates for the total production - and how this is developing. This appears to be a difficult task for an institution producing not only "numbers" but "information". However, there are some proxies that might be utilised to assess output, such as:

- Published titles
- Press releases
- Electronic products (diskettes, CD-ROMs)
- Number of releases of statistics according to the release calendar
- Data (cells) in dissemination data bases (regional, time series)
- Published articles in national and international scientific magazines
- "Pages"/"megabyte" available on web

Parts of the mentioned information have been utilised and proved valuable in the annual reporting from Statistics Norway, for instance tables on output, timeliness for monthly, quarterly and annual statistics, punctuality, response levels, response burden and resource usage. The following tables show recent examples of these indicators.

Table 1. *The number of releases of statistics*

	1997	1998	1999	2000
Releases	642	754	740	761

Table 2. *Number of publications produced*

Publications	1996	1997	1998	1999	2000
Total number	258	268	286	316	284
Official statistics (NOS)	83	76	61	64	48
Analytical publications	66	77	84	97	85
Other publications	109	115	141	155	151

Tables 1 and 2 are examples on traditional measures on output: the total number of releases and publications. However, these are rather crude and do not give a fully relevant description of the total output that more and more is in the form of downloads/print outs from the web sites.

Table 3. *Timeliness. Duration from reference date to publishing. Weeks*

	Number	1998		1999		2000	
		Target	Result	Target	Result	Target	Result
Monthly statistics	13	3,8	3,8	3,8	3,8	3,8	3,8
Quarterly statistics	17	9,8	9,1	9,0	8,6	8,2	8,0
Annual statistics	Varying	42,5	44,9	43,4	41,0	43,8	45,4

Timeliness or actuality is an important indicator in relation to quality and overall performance. This overview is based on a mapping of most of the regular statistical production processes. The production time for annual statistics is partly influenced by the different numbers of statistics included and some arbitrary delays in release from one year to the other.

Table 4. *Punctuality. Deviation in relation to pre-announced date. Per cent*

	1997	1998	1999	2000
All deviations	14	10	13	15
Too early	6	2	4	2
Too late	8	8	9	13

This table is based on a processing of the release calendar. It should be observed that it is not always good to be too early in relation to planned release date. It might confuse users, and in some cases give rise to a suspicion that we are not independent. It could also indicate too cautious planning.

Table 5. *Response rates. Per cent*

Surveys	Number of surveys	1998		1999		2000	
		Target	Result	Target	Result	Target	Result
Obligatory							
- wage statistics	11	100	84	100	95	100	96
- other statistics	17	93	92	90	91	92	89
Voluntary surveys	21	74	69	71	73	79	74

Response rate is an important indicator to assess accuracy for survey based statistics. The summary above is based on figures for each survey.

Table 6. Response burden. Man years

	1997	1998	1999	2000
Total	200	196	188	146
Businesses and industries	110	113	138	98
Other respondents	90	83	50	48

Response burden has been given increasing focus, and there is a long-term objective to reduce the response burden, by using new and efficient technology. The figures above are based on an assessment of the time usage for each form in the surveys, multiplied by the number of respondents. In general it is assumed that the response burden for pure statistical surveys alone is rather limited, compared to the total response burden incurred by all types of administrative forms and commercial market research.

Table 7. Resource use by type of activity. Percentages

Type of activity	1999	2000
Total	100,0	100,0
Production and dissemination of regular statistics	46,2	45,5
Development projects	4,7	7,0
Research related activities	8,1	8,0
Administration and planning	8,8	8,0
IT support and other infrastructure	16,8	16,7
Holidays, sick leave etc.	15,4	14,9

This table illustrates that about 8 per cent of the total resources used within Statistics Norway is related to research activity, while around 46 per cent is allocated to the regular statistical production.

It should be underlined that even if we may have been developing fairly concrete performance indicators, there is still much more work to be done to get more and better information on overall performance. This includes reliable data on the volume of output and on user satisfaction and other quality indicators mentioned in this paper.

So far, little effort has been made to compare in a systematic way performance indicators for Statistics Norway with that of other statistical agencies or comparable organisations.

However, there has been some work for several years to present and discuss some indicators for comparisons at a Nordic level. Some of the indicators discussed in this connection have been:

- Total expenditures and employment broken down by main categories
- IT - solutions and technological change
- Organisational adaptations

Efforts to make comparisons on a more detailed product or thematic level have proven difficult due to problems in identifying comparable products.

Based on the efforts at the Nordic level and also some efforts to collect cost estimates at European level, some of the issues to be addressed in order to make progress on comparisons of the statistical production systems in different countries appear to be:

- How is it possible to measure output of the statistical production systems in a comparable way?
- How is it possible to give a comparable structural description of the statistical production system - including the national statistics institute, as well as other different partners?
- How is it possible to specify the different cost elements in the production of statistics - taking account of different accounting practises and organisational models?
- How is it possible to distinguish comparable products and routines/processes for which more concrete performance indicators can be developed?

6. Systematic quality work

Statistics Norway has credibility in the Norwegian society. There are strong requirements on quality of official statistics, including requirements from international agencies such as Eurostat and IMF. The use of statistics for policy formulation and decisions also increases the demand for high-quality statistics, and makes the results of erroneous or delayed statistics more visible. At the same time the governmental budgets are cut, and the extent of market funding for projects achieved in competition with others is increasing. Quality work is important to ensure our position and improve our products, in order to satisfy existing and new users and requirements. It is also the key to improving the efficiency and enabling the organisation to face new challenges. This is the background for embarking on a systematic quality approach now.

Our systematic quality work is based on the principles of TQM (Total Quality Management) and on experiences from other NSIs. User needs are as mentioned the point of departure for our approach. In short we can say that all indicators expressing something (important) that affects user satisfaction are quality indicators. Hence, the issue of selecting quality indicators is to translate user needs into requirements of products and eventually processes.

The dimensions of product quality for statistics are often described according to Eurostat's criteria:

- Relevance
- Timeliness and punctuality
- Accuracy
- Comparability and coherence
- Accessibility and clarity
- Cost

Statistics must also be objective, and personal integrity must be protected. The response burden is also a quality indicator since it contributes to the costs of statistics for society.

Good product quality is necessary to satisfy user needs, but improving process quality is a precondition for better product quality at an acceptable cost (box 2). An example of the relationship between product and process quality is the link between the *accuracy* which is an indicator of product quality, and the *response rate* which affects the accuracy and is an indicator linked to the survey process (process variable).

The systematic approach encompasses all activities and all employees in Statistics Norway, and commitment from all levels of management is a precondition for success. To ensure this several seminars and training schemes for our managers have been carried out. All directors or departments heads and all division and office heads (in total about 50) have been given two days of training. During the first half of 2001 we have educated 18 quality pilots who will participate in improvement projects as facilitators to ensure that quality principles are followed. Westat, an American statistical and consultant organisation who also have assisted Statistics Sweden and Statistics Finland, has assisted us and carried out the training of both the managers and the quality pilots.

Improvement projects vary by area, but the first of these projects with quality pilots are relatively limited in scope and time.

Examples of quality improvement projects are:

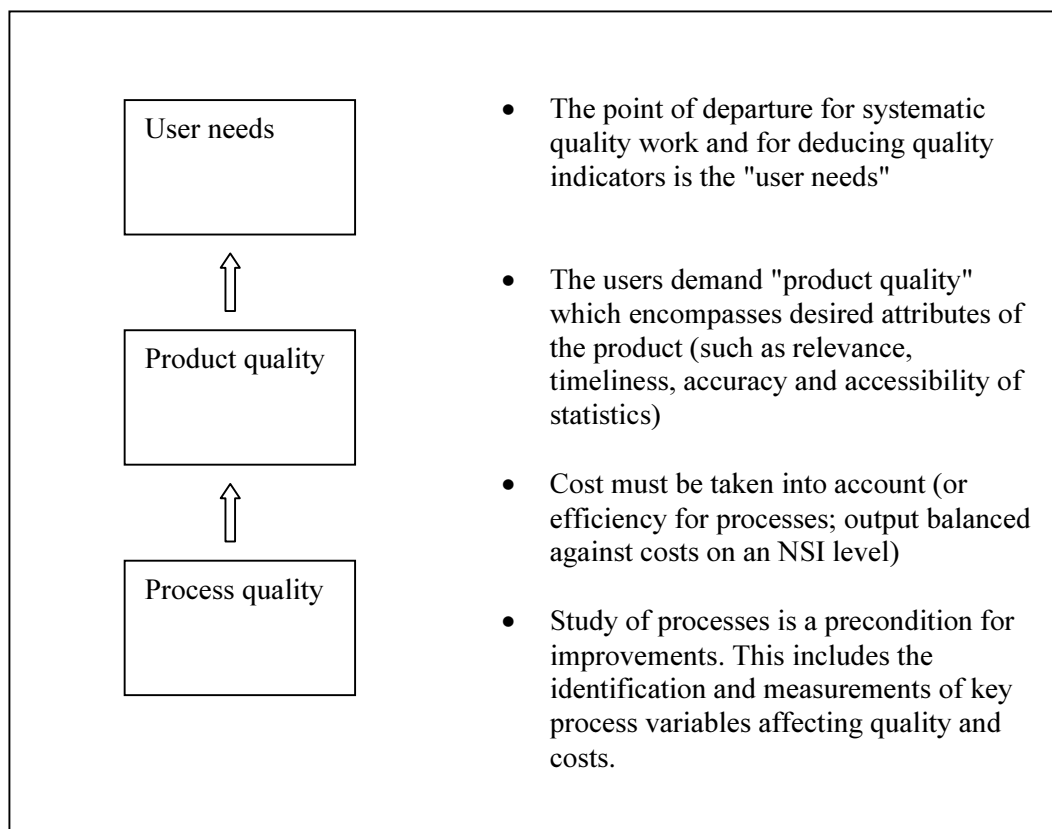
- Accuracy and quality control limits for the Consumer Price Index
- The documentation process in the Survey of Living Conditions
- Editing in the Sample Survey of Agriculture and Forestry
- The process of recruitment and appointment.

The pilots will usually not do normal project work, but participate in project meetings and teach the team members in quality principles and give advice ensuring that these are followed. For quality improvement projects techniques for mapping the processes involved are important, and pilots are trained in such techniques and in identifying and measuring critical process parameters. Asking questions like: Who are the users? What do you do? How and why? is part of their role. Normally, the pilot will come from another area or division in the organisation than the project manager.

Existing activities are included in, or when necessary, adapted to the systematic approach. This includes the activities described in this paper on user orientation and dissemination, documentation and performance indicators. Other relevant activities comprise major development projects on co-ordination and electronic data collection, restructuring of our survey division, elaboration of a new long term strategy, management and other human resources development.

There is normally a positive correlation between user satisfaction and employee satisfaction. Hence, surveys to map employee satisfaction are part of the systematic quality work as well.

Box 2. Definition of total quality in Statistics Norway



7. Case study: The Consumer Price Index

The Consumer price index (CPI) is one of the most important and widely used macroeconomic indicators. To ensure and document its quality is crucial, and a programme with the purpose to develop and establish a formal system for quality assurance has been initiated. The work includes analysing the quality of the CPI as a product as well as studying the underlying monthly production process. The quality system should further ensure adequate control for less frequent processes such as the annual update of the basket of goods and services and the sample of outlets.

Activities and results of the quality work on the CPI so far:

1. User requirements have been identified
2. Processes and production cycles have been mapped and the sub-processes have been better documented
3. Problems during the production cycle and possible causes have been identified
4. The use of electronic data based on bar codes has been expanded
5. Improved routines for the analysing and dissemination phase have been introduced

Remaining activities:

1. To develop procedures for systematically analysing the variance in the all-item index and sub-indices
2. To develop differentiated reminding procedures depending on which industrial sector the missing outlet belongs to
3. To determine and measure key process variables affecting quality (for each sub-process in the monthly production cycle)
4. To complete the documentation
5. To develop and introduce a formal quality assurance system
6. To develop and introduce CBM (current best method) for certain processes, e.g. in order to reduce non-response

User needs

The main users of the CPI such as the Central Bank, the Ministry of Finance, trade unions and employers associations, the National Accounts Division and the Research Department of Statistics Norway are participating in an Advisory Committee for Price Statistics. Other users are the media, public administration, Eurostat, external research institutions, other economic analysts and the general public. Timeliness, punctuality, accessibility and clarity are some of the main product specifications among the main users. Accuracy is another important quality requirement of the CPI.

In Norway the CPI data refer to the middle of the reporting month (15th), and the results are released on the 10th of next month (9th or 11th if the 10th falls in the weekend). It has been found that the CPI satisfies the timeliness requirement of most users. But it is an objective to improve the production process by ensuring that the workload is more evenly distributed over time (it tends to reach a peak just before publication date).

Some users often request sub-indices that are not available at present such as an indicator of the core inflation, regional indices or indices for different demographic sub-groups. Accuracy is the key quality indicator in relation to these needs. This means that an increased number of price observations and development of systematic measures of sampling and non-sampling errors are needed to develop new products or publish sub-indices that are not available today.

The production cycle and quality control

So far much effort has been put into mapping the monthly production cycle to identify the core processes and the inter-relationships between different parts of the production cycle.

The production cycle can be split into 3 main processes:

- Data collection
- Data editing and validation
- Dissemination

Each of the main processes can be split into several sub-processes (see box 3 which is an example of a process diagram for the editing process). New and better technology has made the production cycle of the CPI more efficient, and less people are involved today than a few years ago. Still, the production scheme is very tight and leaves no room for unexpected situations. In general, the different phases seem to be pretty stable, although establishing measurements of the variation is necessary.

In order to develop procedures for systematically analysing the accuracy of the CPI, there is a need to select and study variables affecting this in different steps of the production cycle. When completed the quality system will monitor the production cycle through systematic checks of non-sampling errors that can arise in every step of the production.

Data collection

The price information is mainly collected by means of questionnaires. From some retail chains we receive data electronically based on scanned bar codes read at the cashier's desk. Rates of missing price observations, the number of out of range items and inconsistent price observations are variables that can provide useful information on error sources like the questionnaire design, the reminding phase and the data entry.

Over the last years the design of the questionnaires has been radically changed. Now every outlet in the sample receives a unique questionnaire where the prices of the two previous months are pre-printed. The questionnaires also contain guidelines on how to handle different situations that outlets might face. When filling out the questionnaires, some outlets may for convenience just copy the previous month's prices instead of filling in the correct prices. The most obvious cases of this error are revealed in a manual check carried out when receiving the questionnaires. When a good or a service is removed from the market the outlets are instructed to find a replacement and mark it in the questionnaire. If they report a price of the replacement without marking it, the difference in price between the old product and the replacement will incorrectly be registered as a price change of the old product. The extent of this error is unknown. After checking the questionnaires manually they are registered in an optical scanner. The scanner process is very reliable, and few errors occur here.

During the process mapping we found that *the rate of non-response* is one of the most critical process variables. Non-response causes variation in the all-item index and sub-indices and thus will have an impact on the accuracy of the CPI. One way to lower the variance in the all-item CPI is to make more price observations of commodities with large expenditure weights and/or large variance in the prices collected. To day much effort is put into increasing the response rate from 90 to 95 per cent which is the objective, but Statistics Norway does not systematically analyse how this response rate influences the variance in the all-item index.

The process mapping underlined the need to analyse the distribution of the non-response in a more systematic way. Such an analysis can help to concentrate the efforts on reducing non-response to outlets having the largest impact on the CPI. Further analyses might show that even though the total response rate is somewhat lower than 95 per cent, the variance is within acceptable limits as long as the response rate among critical sectors/groups is within an acceptable limit. On this basis Statistics Norway will review the process of reminding and also differentiate the type of reminding depending on the industrial sector of the outlet.

Increasing the use of data based on bar code readers is another way to improve the response rate of the CPI. Statistics Norway has started a project to identify outlets (especially retail chains) that can provide such data. So far around 50 per cent of the retail chains are delivering their price material electronically based on bar codes. It is the aim that all the retail chains in Norway shall provide such data by the end of this year.

Data editing

Two years ago a complete computerised system based on standard software (SAS and Oracle) for data consistency checks was introduced. The first checks are run to identify and avoid unexpected duplicate prices and other errors that might occur during the data entry phase. In the next step different validations are run to identify and invalidate price movements which differ significantly from the average of an item. The price material is sorted by item and region, and further scrutinised. Sub-indices and item-indices are also checked against time-series published earlier and compared to other relevant statistics. Change rates in sub-indices and item-indices are given special attention when changes in fees and charges occur.

Before 1999 the editing was manual both on micro and macro level. The new system has improved the production process as fewer persons are involved in the editing and less time is spent. Less room for subjective editing is another benefit of the new system.

The sample of commodities is revised in August every year to ensure that it reflects the consumer patterns of the households. However, in calculating the CPI one regularly faces the problem that some of the commodities to be observed disappear permanently from the market and new become apparent between the regular revisions. To capture this, the number of imputed prices per commodity can be used as an indication whether the commodity is out of range or not. As a part of the quality work, the system also will be expanded so that calculation of bias in the CPI due to sampling rotation can be accomplished.

Dissemination

Some changes in the routines of writing and publishing the Statistics daily (the press releases) have been made. After all the necessary validation checks, the staff involved go through a meeting preparing the press release. The aim of the meeting is to get a common understanding of the CPI-figures and to distribute the writing tasks. Punctuality is a quality indicator linked to the dissemination phase. In recent years the CPI has always been published exactly at 10.00 on the Internet. To ensure clarity, the press release has been re-designed. The press releases are also written and published in English.

The new routines have improved the writing of the press release and reduced the time the management has to spend on approval.

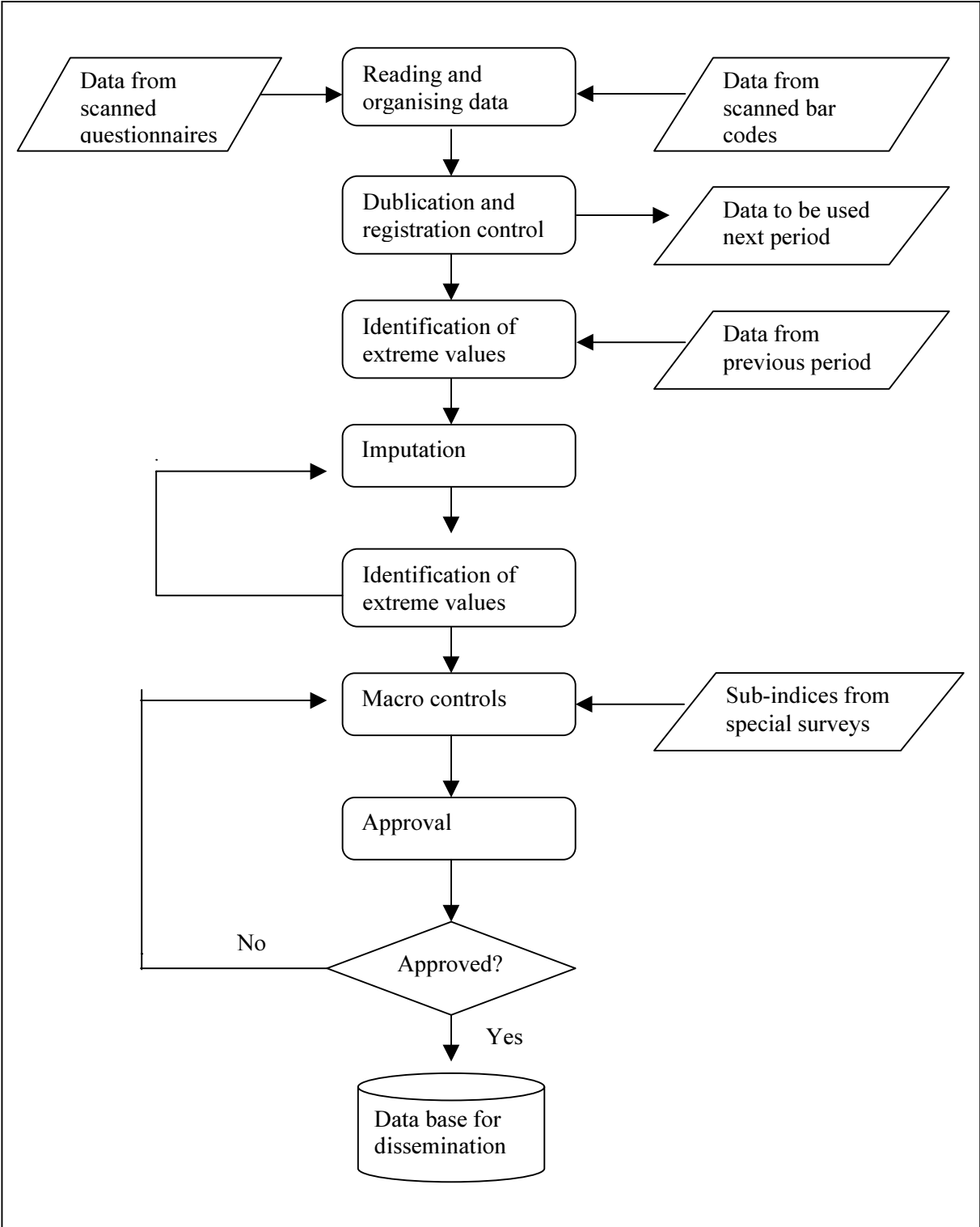
Documentation

Large efforts have been put into documenting the production process of the CPI. When completed, the documentation can be separated into four levels:

1. The quality manual which defines the quality of the CPI and gives an overview of the quality system and organisation structure
2. Description of the procedures of the monthly production cycle, including a clarification of responsibilities and who is to do what
3. Work instructions that give precise details of how individual tasks should be carried out
4. Reference documents such as different kinds of handbooks etc.

The second and third levels are almost completed, although systematic quality checks for each procedure have to be established. Working out the formal quality manual and completing the quality assurance system remains to be done. Different reference documents exists, including a newly updated Technical Manual. The Technical Manual gives a description of how the price data are collected and aggregated into the CPI. This manual is mainly aimed at internal and expert external users.

Box 3. Simplified process diagram for editing of CPI data



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