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Contents

Ranking: right or wrong? Some problems in comparing national statistical offices and systems

Willem de Vries

1. Introduction

At the 47th plenary session of the Conference of European Statisticians at Neuchâtel in Switzerland in June 1999 the topic for substantive discussion was 'Performance indicators'. A couple of papers that were discussed in this regard generated some excitement. One in particular, an invited paper by Robert Chote, Economics Editor of the *Financial Times* (Chote, 1999), was rather furiously attacked by several participants, some of whom even requested it be excluded from the official proceedings of the conference. My own paper (De Vries, 1999) for the conference was less controversial, except for a small table I showed, which was not part of the paper itself, comparing statistical systems on costs. In particular, some eminent statisticians whom I greatly admire, said that 'benchmarking on costs' was nonsense. Admittedly, it is a very difficult exercise, and in fact my table was taken from a report which is mostly about precisely these difficulties. Therefore, the purpose of this article is to explain how the table came about and what it may or may not be worth.

2. Risks of ranking

When the newspaper *The Economist* published rankings (or league tables) of national statistical offices some years ago, quite a few senior statisticians were upset and although there was little public discussion about the method that *The Economist* had used, there was broad agreement that the assessment had been superficial and that the results were debatable, to say the least. I will not go into the technicalities of *The Economist*'s ranking approach, except to say that a combination of 'objective' criteria and judgement by peers was used.
Robert Chote's ranking was based on assessing the performance of national statistical systems against the IMF Special Data Dissemination Standard (SDDS), a voluntary standard, agreed by about 50 countries now. Its purpose is to make the quality of official statistics more transparent for the users. The main dimensions of the SDDS are:

- data characteristics (coverage, periodicity, timeliness);
- access by the public (advance dissemination of release calendars, simultaneous release to all interested parties);
- integrity and transparency (government access to data before public release, government comments on data, revisions etc.);
- quality (methodology, sources, possibilities to crosscheck).

Chote's ranking results were based on a kind of weighted aggregate score on five main dimensions (coverage, periodicity, timeliness, release calendar and the presence of a hyperlink, allowing users to move directly from the IMF bulletin board to national statistical websites). He is the first to admit that his approach has its flaws; he himself says: 'The table at the end of this paper illustrates just one way in which this (ranking) might be done…. This framework is open to all the same criticisms of incompleteness and inappropriateness that was levelled at *The Economist*…But I am the first to concede that it would have to be a rather more rigorous and carefully thought out exercise than the back-of-an-envelope attempt I have made here'.

In spite of all these reservations from the author, the table came as a shock. Latvia headed the table, followed by Canada, Slovenia, Peru, the United Kingdom and Japan. Well-respected statistical offices such as those of Switzerland (27th), Australia (30th) and Iceland (40th) were shown as lagging far behind. The Netherlands found itself in 20th place, although if we took more care of our hyperlinks, we could get into the top ten. In particular the 'composite' nature of the total score was one of the points raised in criticism of the list.
One may question the significance of statistical ranking exercises as a matter of principle, but the fact of the matter is that statistics are used for ranking all the time. And rarely does this seem to shock the statisticians very much, even when the ranking is based on highly composite and/or relatively 'soft' measures, such as per capita GDP, research and development expenditure as a percentage of GDP, illiteracy rates, or poverty and development indicators etc [1)]. So it seems curiously paradoxical that while statisticians can live with many kinds of rankings, they get jumpy when they themselves are the subjects of such an exercise. And a second paradox, which I shall discuss further below, is that official statisticians are supposed to be good at measuring nearly anything of relevance to society, but are definitely not very good at measuring their own activities and performance, at least not in my experience.

3. Why performance measurement?

Government budgets are under continuous pressure in most countries. There is a general tendency towards reducing government spending and therefore the spending on official statistics is also regularly scrutinised. Statistical offices are often relatively large and costly operations, and, as everyone knows, continuous technological and other developments make it easier to compile statistics more efficiently. So governments are likely to ask us, from time to time: can't you do it cheaper? And in asking this question, it is practically inevitable that they also ask: and how do you compare with similar institutions in other countries? [2)]
In exactly such a scenario, the Dutch government and parliament recently asked us to do a summary comparison exercise. The remainder of this article represents our answer to this request. It should be noted here, that the results have little to do with 'ranking' in the proper sense, although the order of countries in the small comparison table of the document, may be construed as such (from 'expensive' to 'less expensive' statistical systems).

4. Comparing statistical offices: the difficulties

The question was whether Statistics Netherlands is big and costly, compared with similar organisations in other countries. It is difficult to answer this question with any degree of precision as only a very global comparison is possible. The following reasons make comparisons of this kind rather problematic:

- The general organisational structure of statistics (centralised or decentralised);
- Coverage of the statistical work programme, i.e. which subject matter areas are covered; the work programme of Statistics Netherlands, for example, covers a very wide range of subject matter areas);

- The size of the country (there are certain economies of scale; on the other hand it should be recognised that large countries often have some sort of regionalised administrative and statistical structure, which may imply inefficiencies);
- Administrative and legal infrastructure (which may be relevant for the possibilities to use registers for statistical purposes);
- Special responsibilities that some national statistical offices may have (e.g. economic analysis).

Some explanations of concepts

- What is meant by 'central' and 'decentral'? In some countries, for example the Netherlands, Sweden, Australia and Canada, the production of national statistics is the responsibility of one single organisation, regardless of how many 'offices' it may have. In other countries, however, there is some kind of decentralisation, either regionally – often, but not always, in combination with a 'federal' administrative structure – or departmentally, i.e. ministries producing statistics for their own policy areas, or a combination of various forms of decentralisation. Pure forms of 'central' and 'decentral' are relatively rare, but it is widely believed that any form of decentralisation implies certain negative efficiency effects.
- A factor that is difficult to measure is the role and significance of statistics in individual countries? To what extent are political and administrative decisions (e.g. the financing of regional and local authorities, budget policies, wage bargaining etc.) based on statistics? Many countries apparently have forms of 'formula use' of statistics, which give statistics some extra weight. In countries with some kind of federal structure this is certainly true, but it also applies to the European Union. It is hard to say what effects this phenomenon has on statistical expenditure. For the countries of the European Union included in the comparison in this article, it may be said that they all have to comply with the so-called *acquis communautaire* (for Statistics Netherlands, 70 per cent of the work programme is covered by European regulations and directives), and are therefore in a more or less comparable situation.
- As to 'administrative and legal infrastructure', an important question is to what extent registrations exist: in the Anglo-Saxon countries, for instance, there are no population registers; and secondly, whether there are legal and other arrangements that enable statistical offices to use these registrations for statistical purposes. In Scandinavia these arrangements are very well developed. If there are no registrations, or if they may not be used for statistics, other - relatively more expensive - forms of data collection are necessary: population censuses, for example.

The comparison presented here deals with some larger and medium-sized, economically developed countries, which have a statistical system that is generally considered to be good or adequate (e.g. according to the league table developed by The Economist in 1993, which ranked Canada, Australia and the Netherlands as the top three). Besides the Netherlands, eight countries were compared, six in Europe: Sweden, Finland, Denmark, France, Germany, and the United Kingdom, and two outside: Canada and Australia.

Brief outline of the statistical systems involved

Germany, France and the United Kingdom (although recently measures towards more centralisation have been taken) have fairly decentralised statistical systems.
The Netherlands, Sweden, Finland, Denmark, Canada and Australia have a centralised system, though some of these countries have more than one statistical 'office', either offices per state or province (Australia, Canada), or two locations (Sweden, the Netherlands).

In Germany there is a *Statistisches Bundesamt* in Wiesbaden, roughly 500 km from the new government centre Berlin. The former fairly large branch office in Berlin recently moved to Bonn, the former government centre, as a compensation for the ministries that are being relocated from Bonn to Berlin. However, most of the data collection and dissemination is done by the statistical offices of the *Länder*.

France has both regional and departmental decentralisation. Apart from the central office INSEE (*Institut Nationale pour la Statistique et les Analyses Économiques*) in Paris, the ministries have their own statistical departments which are loosely connected with INSEE, which appoints the senior statistical managers, however. In addition INSEE has some dozens of regional offices for data collection and dissemination.

The United Kingdom traditionally had a small central statistical office, set up by Winston Churchill during World War II, but most statistics used to be produced by ministries. Co-ordination and confidence problems in the nineties led to centralisation of the most important economic and social statistics in one office: the Office for National Statistics (ONS). Part of ONS is located in London, but there are some other offices as well, including one in Newport, Wales, roughly 250 km from London.

Statistics Canada has its central office in Ottawa, but there are branch offices in each of the Canadian provinces as well.

In Australia the central office of the Australian Bureau of Statistics (ABS) is located in Canberra, but in addition there is an ABS office in each of the states. These regional offices do some specific statistical work for the government of their state, as well as some data collection and dissemination for the ABS, but they are also responsible for a certain part of the *national* statistical programme, for example business registers and service statistics (Melbourne), mining (Adelaide), or the financial sector (Sydney).

Sweden (Stockholm/Orebro) and the Netherlands (Voorburg/ Heerlen) have one statistical office with two locations (in both cases about 200 km apart). Norway and Ireland have a similar structure. Finland and Denmark, lastly, have one organisation and one location.

5. Comparison of some indicators

The table below compares some indicators for the nine countries mentioned, in particular with respect to inhabitants and number of 'official statisticians', as well as the increase or decrease in this number over a certain time period, and government spending on official statistics, related to GDP (1998).

	Inhabitants (mln)	Statisticians (year)		Statisticians (1998)	+/- (%)	Statisticians per mln inh.	Expenditure (% of GDP)
Canada	27	6 200	(88)	7 200	+16	267	0.04
Australia	17	3 800	(83)	3 800	0	224	0.04
Finland	5	767	(83)	915	+19	183	0.036
France	60	9 841	(85)	9 337	–5	156	0.024
Netherlands	16	3 500	(83)	2 400	–31	150	0.037
Germany	75	9 300	(83)	11 041	+19	149	0.025
Sweden	9	1 555	(83)	1 084	–30	144	0.034
Denmark	5	635	(85)	660	+4	132	0.025
UK	56	6 502	(83)	4 560	–30	82	0.019

Explanation and commentary

In the table, expenditure, as a percentage of GDP, is based on gross budgets. The share of 'own' income that statistical offices may have from sales of products or specially financed projects, as a rule varies from 10–20 per cent of the overall budget; in the case of Statistics Netherlands it is about 10 per cent.

Germany: The increase in the number of statisticians between 1983 and 1998 is mainly a result of the re-unification of Germany, when a number of East-German statisticians were taken over by the *Bundesamt*.

United Kingdom: The recent history of British statistics has been turbulent. In the Thatcher period severe budget cuts were implemented, based on the philosophy that official statistics were to serve government interests only. This policy was later partly reversed. In addition many important statistical offices merged, making comparisons over time rather difficult. However, it would seem that official statistics in the UK are remarkably inexpensive.

Canada: The increase of staff between 1988 and 1998 is partly based on new statistical work to support the redistribution of VAT between some Canadian provinces, which involves some 700 staff. Excluding this effect, the number of statisticians per million inhabitants for Canada would be 237.

France: The numbers include the *départements d'outre-mer*. In addition to production of statistics, INSEE is also charged with economic analysis. It is difficult to say precisely how many staff are engaged in this work, but 200 would seem to be a fair estimate.

As for the Scandinavian countries: in Sweden, Finland and Denmark a substantial number of official statistics (80 to 90 per cent) are compiled on the basis of register information. In the Netherlands this part is estimated at 60 per cent. In Sweden, official statistics are financed in a rather unusual way: instead of a central budget, a substantial part of the programme (40 to 50 per cent) is financed on the basis of 'contracts' between Statistics Sweden and other agencies. This makes it difficult to compare expenditure.

Some general conclusions

Compared with some other countries, the ratio statisticians to inhabitants and statistical expenditure to GDP, i.e. the cost level, of Dutch statistics is 'average'. In some countries – which, by the way, have excellent statistical systems – statistics are clearly more expensive. [3)]
Of all countries in the comparison, the costs of Dutch statistics have been reduced by most over the last ten to fifteen years. Only Sweden and the United Kingdom have experienced similar developments.

6. Can we make better comparisons?

As I have mentioned before, I do not think statisticians are very good at and/or really interested in measuring themselves, and definitely not in a way that makes comparisons across countries easy. Over the last fifteen years or so I have been involved in various comparison exercises of this kind and most of them have been complete failures. In the eighties we tried to compare the costs of external trade statistics and the consumer price index between a few countries in Europe, and after some time the effort was aborted because it proved too difficult and too time-consuming. Eurostat and a Eurostat working party have tried for many years now to make cost-benefit comparisons between EU national statistical offices and some of their specific products. Clearly, benefits of statistics are very difficult to measure, but even as far as cost is concerned, the results so far are practically nil, one of the main reasons being that the experts involved could not agree on definitions and various measurement issues. The latest development in this respect is that a final effort is to be made to continue with cost comparisons, forgetting about the benefits. Another example is the Mahalanobis Committee, created by the International Statistical Institute in 1995. Its aim was to develop 'statistics about statistics'. There have been no results so far, the reasons being on the one hand a total lack of interest in participating in the committee's work, and on the other hand widespread disagreement about how to tackle the issue. The most recent important initiative that I know of was taken by the Australian Bureau of Statistics, which invited some sister agencies (including Statistics Netherlands) to participate in a benchmarking exercise on the cost and quality of some sets of statistics. At this stage it is too early to say whether the ABS exercise will work.
I believe it is obvious that governments will go on asking statistical offices about their performance and efficiency compared with statistical offices abroad. Therefore, but just as importantly because it is worthwhile for statistical offices themselves to know how cost-effective colleagues in other countries do their work, I think the international statistical community would be well advised to make a real effort to improve their performance and cost-accounting measurements, and try to do so in an internationally comparable manner. Perhaps there is a challenge here for the Conference of European Statisticians or indeed the United Nations Statistical Commission.

After all, I think there is some irony in the fact that while statisticians are constantly trying to agree in great detail which internationally comparable information (in terms of definitions, classifications, other measurement methodology etc.) to ask from businesses, institutions and households, they do not wish to agree on the measurement of their own operations, and are apparently unable – up to now – to agree on universally accepted definitions of concepts such as non-response or, indeed, statistician.

For further information or comments on this contribution, please contact Willem de Vries: devries@un.org.

Notes

1. GDP is clearly one of the most complex and composite statistical measures in the world today, even though one may argue that there are detailed, internationally agreed rules on how to calculate GDP, in the UN System of National Accounts.
2. An interesting point here is, clearly, that national statistical offices are 'unique institutions' in their own countries, rather difficult to compare with other government agencies, but are far easier to compare, in principle, with sister offices abroad.
3. The Canadian Chief Statistician's spontaneous comments when I said that Statistics Canada seemed to be expensive was: 'But worth every penny', which may well be true.

References

Chote, Robert. *Performance indicators for national statistical systems.* CES/1999/14. 30 March 1999.

De Vries, Willem. *Are we measuring up? Questions on the performance of national statistical systems.* CES/1999/15, 26 March 1999.

Redesign of the Dutch Travel Survey: Response improvement

Ger Moritz and Werner Brög [1)]

Non-response in the Dutch National Travel Survey (Onderzoek Verplaatsingsgedrag – OVG) has been a matter of great concern at Statistics Netherlands in the last years. A continuing downward trend in the response level resulted in an overall response of less than 35% in 1998.
A task force investigated the possibilities for improvements and recommended performing a test using the integral 'NEW KONTIV DESIGN (NKD)' from Socialdata (Munich). In co-operation with Socialdata, Statistics Netherlands tested this design in September 1997 ("Glass House" project). The NKD resulted in significantly higher response rates and better coverage of the target population compared with the OVG design. In March 1998, Statistics Netherlands started implementing the NKD. In 1998, both designs (OVG and NKD) were conducted alongside each other.
This article looks into the developments in the OVG since 1985, the results of the NKD pilot in September 1997 and the first results of the parallel running.

1. Introduction

For some years now, the Dutch National Travel Survey (OVG) has suffered from a significant decline in response (Table 1). The OVG is a cross-sectional survey which Statistics Netherlands has been conducting continuously every day of the year since 1978. Until 1984 the data were collected in personal interviews, but due to budget cutbacks put an end to this and since 1985 they have been collected by means of telephone interviews combined with questionnaires which respondents have to complete themselves and return to Statistics Netherlands (Hendrikx, 1988).
The stratified sample for the survey is drawn from the so-called Geographic Basic File. The survey population encompasses the resident population of the Netherlands and the sampling unit is the household. Where possible, the Dutch telephone company adds telephone numbers to the addresses. The sample is spread randomly over all the days of the year. The telephone approach means that households with unlisted numbers as well as those without a telephone are excluded from the survey. From 1995 onwards the yearly sample size was expanded from 10,000 to 60,000 households (net response) resulting in a data file with 600,000 journeys undertaken by 150,000 people per year. The Ministry of Transport and Public Works finances the expansion.
Since 1985 the necessary data are collected through a telephone interview and a journey diary sent by post. Statistics Netherlands sends an introductory letter in advance, announcing the telephone call. During the telephone interview (CATI) respondents are asked some details about the household, household composition and ownership of various means of transport. Then the diaries are sent to the household by post. Each individual in the household is asked to keep a record of all his or her journeys for one day. In addition they are asked to answer some questions on income, education, and occupation.
If the respondent does not return a completed diary within five days of the reference date, he will receive a first recall with a new diary, asking him again to keep a record of all journeys on a new predetermined date (seven days after the first reference date). If the respondent again fails to return a completed diary, a second recall with the request to fill in a new diary on a new date (fourteen days after the first date) is sent.
The decline of overall response rates (column 5) stems partly from an increasing proportion of unlisted telephone numbers (column 2) and an overall tendency of reduced willingness to participate (columns 3 and 4). Combined, these factors resulted in a drop of overall response rates from 51% in 1985 to 35% in 1998. Since only about 85% of the responding households provide complete data, the 1998 response result at household level was in fact less than 30% of the original sample.
The decrease in the number of households that could be reached by telephone and the rapidly falling response rates gave rise to serious and increasing doubts with respect to the representiveness of the sample and the comparability of survey results (Van den Brakel, Luppes and Moritz, 1996; De Heer and Moritz, 1997; Moritz and Van Evert, 1998). At the same time policy makers wanted more information on transport and mobility. These developments prompted Statistics Netherlands, in co-operation with the Ministry of Transport and Public Works, to look for an alternative design that would combine significantly improved response results with enhanced research flexibility.

Table 1
Response rates for the Dutch National Travel Survey 1985–1998

Year	Telephone % known	Response CATI (%)	Response diaries (%)	Total response (%)
1985	83.0	75.0	81.5	50.7
1986	82.3	76.0	77.9	48.7
1987	82.3	75.5	77.6	48.2
1988	81.7	75.0	72.9	44.7
1989	81.4	77.0	75.6	47.4
1990	81.0	75.4	73.2	44.7
1991	80.9	75.6	75.6	46.2
1992	78.1	76.4	74.6	44.5
1993	77.3	76.2	73.1	43.0
1994	75.4	72.6	75.4	41.3
1995	75.1	72.0	74.6	40.3
1996	73.4	71.1	73.8	38.5
1997	73.8	69.9	71.3	36.8
1998	72.7	68.0	70.2	34.7

Preliminary investigations for a new design of the Dutch National Travel Survey resulted in a choice for the German New Kontiv Design, developed by the institute Socialdata in Munich. Statistics Netherlands tested the design in a pilot study supervised by Socialdata in September 1997.

2. Pilot study with the New Kontiv Design

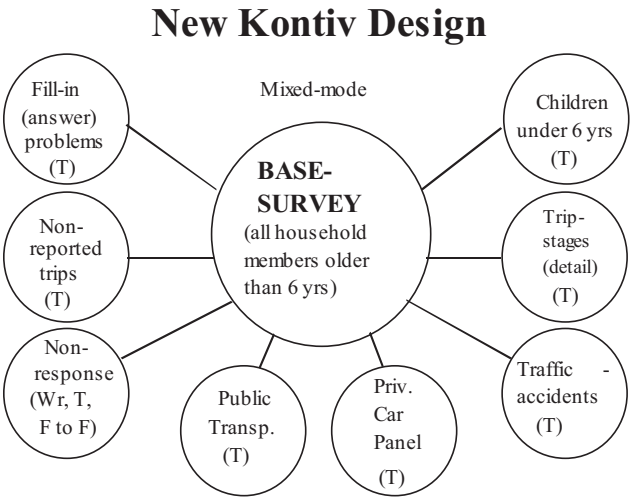
Plan of the NKD pilot study

The New Kontiv Design was developed by Socialdata in Munich (a research institute in the field of traffic and infrastructure), and has been implemented successfully in several countries. In September 1997, Statistics Netherlands conducted a pilot study with this design to test whether it would result in the required significant response improvements compared with the OVG design.
The NKD is set up as a normal written survey, with telephone motivation of respondents and the possibility of subsequent follow-up surveys for more detailed data per sub-group. An

important advantage of a written survey is that this method of data collection is generally the least burdening for respondents: they are phoned shortly after they receive the survey material and are motivated to fill in the questionnaire and the diary. The telephone is not used to actually conduct the survey, but merely as an instrument to encourage respondents to participate. Only if the required information cannot be obtained otherwise are data collected by telephone, for example if the respondent asks for help.
The basic NKD survey consists of a printed questionnaire for the household and one for each individual within the household. In the latter questionnaire, respondents are asked to report their journeys (activity based) for a specified day. The questionnaire itself is kept as simple and thus user-friendly as possible. Respondents are not bothered with definitions or questions that would only apply to a small proportion of the population.

The idea is that respondents can answer questions in their own words. Only clear understandable categories for mode and purpose of the trip are given. For example, the NKD questionnaire gives four purposes (work, education, work-related business and shopping plus return home) and an open space. From these a total of 27 categories for purpose are coded, which the respondents report in their own words. Furthermore, this procedure avoids misunderstandings by the respondents (Brög and Erl, 1999).
Pre-coded answers, explanations or definitions may lead to confusion. The design aims to put the burden on the survey taker rather than the respondent. If the data from the received questionnaires are incomplete or require clarification, correct or additional data are collected by telephone.

Figure 1.



If necessary, the basic questionnaire of the NKD is followed up by several 'satellite surveys' (see figure 1) to obtain additional data for specific sub-groups (for example, children under 6 years of age) or subjects (for example, use of public transport). These satellite surveys are mostly carried out by telephone, but other methods of data collection can also be used. In contrast to the OVG design, the NKD makes it easy for respondents to co-operate and thus more difficult to refuse. The NKD's basic starting point is: the researchers must adjust to the respondents, not the respondents to the researchers. Although self-evident, this principle is often forgotten in the construction of survey designs.
The diary is designed in such a way that the each trip is defined by the individual activity performed at an out-of-home destination. The basic idea behind the diary design is to obtain all information concerning the out-of-home activities performed, not simply that which reflects the researcher's a priori views on "formally correct" answers. Correspondingly, the possibility for respondents to report in their own words is regarded as more important than the fact that this might result in unclear and confusing explanations. The consistent respondent orientation also results in certain graphic requirements, concerning comprehensibility and readability, for example and the elimination of among other things code symbols in the questionnaire. The technique of using partially structured questions is also a concession to respondents: all clearly understandable answers can be directly ticked, but the others can be openly stated by respondents in their own words.
Since the respondents are best able to keep the diaries themselves, a self-administered survey type is recommended. This methodology places the highest demands on the design and execution of the survey. As these demands are seldom met, it is discriminated against, whereas relevant basic research clearly demonstrates that this survey form is distinctly preferred by respondents and – when professionally carried out – yields excellent response rates. Respondents' survey form preferences were determined for all mobility surveys on which these studies are based, resulting in a clear preference for the mail-back method.
In the pilot study the NKD procedure (see figure 2) was copied meticulously and carried out under supervision of Socialdata. A random sample was drawn, consisting of 1,000 addresses in three Dutch Provinces (Limburg, Noord-Brabant and Gelderland). In the same way, the sample for the control group using the old OVG design (same period and regions) consisting of 1,032 addresses was obtained. The samples were drawn from the Geographic Basic Register (GBR). When the addresses had been drawn from the GBR, the corresponding names and telephone numbers were looked up and added.

Figure 2.

PROCEDURES

NKD	**OVG**
↓	↓
Introduction letter	Introduction letter
↓	↓
Questionnaires (mail)	Household questionnaire (CATI)
↓	↓
Response motivation (tel.)	Diaries (mail)
↓	↓
Recalls (tel. and mail)	Recalls (mail)
↓	
Follow-up surveys (tel.)	

Five follow-up surveys were conducted in the NKD pilot: completion problems (T), non-reported trips (T), journeys of children under 6 years (T), trip-stage details of public transport and non-response (handout/mail-back). About 10% of the returned questionnaires were completed or corrected during a telephone follow-up interview held on the day the questionnaires were received. The same procedure was used to collect data on the travel of children under 6 years, on stages of public transport journeys and on non-reported trips.
Compared with the OVG, the questionnaires and diaries used in the NKD are shorter and easier to read, and contain no explanatory text, examples or definitions. The NKD questionnaires are mailed in advance and followed up by a telephone call to verify the arrival of the material and ask respondents if they are willing complete the questionnaire and send it back. During this call, respondents can also ask about anything they are unclear about. This has the effect of motivating respondents to co-operate. Households without a telephone were approached by mail only.

Results of the pilot

The pilot study achieved a response of 74% of households that were approached using the NKD procedure (table 2), significantly more than the response in the control group using the OVG procedure: 44% of households. This resulted in 70% more diaries. This is the so-called "genuine response", i.e. the ratio of responding households to the net sample of households. This means that sample losses because of invalid addresses, vacant dwellings, etc. are excluded. The difference in sample loss between OVG and NKD is caused by the extra sample loss in the subgroup addresses without a listed telephone number in the NKD pilot. In the OVG survey process these addresses are not contacted, and thus do not supply extra information, while in the NKD group these households were approached by mail, resulting in a response rate of 45%.

Table 2
Response rates

	OVG-control [1]	NKD-pilot
Gross sample size	1,032	1,000
Sample loss	18	38
Net sample size	1,014	960
with telephone	811	765
without telephone	203	195
Responses	446	708
with telephone	446	620
without telephone	–	88
Response rates	44%	74%
with telephone	55%	81%
without telephone	–	45%

[1] OVG control group: same period, region and sample frame as NKD pilot.

The higher response in the NKD group, however, can only partially be explained by this difference. The response for the households for which telephone numbers were known was considerably higher in the NKD group: 81%, versus 55% in the OVG group. The main explanation is that in the OVG group only mail questionnaires were collected, whereas in the NKD pilot the mail questionnaires (64%) were supplemented with telephone interviews (17%). Elderly and more or less housebound people were over-represented in the telephone recalls. However, in many cases interviewers succeeded in convincing respondents that, regardless of their age or lack of mobility on the sample day, their participation in the survey is just as important as that of younger and more mobile people. The combination of the mail-back design with the telephone motivation in the NKD decreases the selective effect with respect to mobility behaviour (non-mobile persons) compared with the OVG design.

In the OVG group, 84% of the responding households' data were complete (obtained for all persons in the household). In the NKD group, the corresponding figure was 90%, but rises to 93% if we leave out the households for which no telephone number was available.
Shortly after the test period and in addition to the standard procedure of the NKD, an extra effort was made to obtain a response in the NKD group who did not refuse, but did not respond within the regular period. A total 97 addresses were reassigned to field interviewers, who attempted – a maximum three times – to contact them. The group consisted of 83 addresses from non-respondents with unlisted telephone numbers and 15 addresses with which telephone contacts had been unsuccessful. This action resulted in an additional 24 responding households.

Table 3
Response by age

Age (years)	OVG control (%)	NKD pilot (%)	Population [1] (%)
0– 5	8.4	5.6	7.3
6–11	8.4	7.7	7.5
12–17	6.7	7.3	7.0
18–29	14.4	14.7	16.2
30–39	17.8	16.6	16.5
40–49	15.2	17.5	15.2
50–64	19.7	18.3	17.1
65+	9.6	12.4	13.1

[1] Same region (1.1.98).

The number of children under six years of age is relatively smaller in the NKD group (table 3) as no data were collected for these children in households with an unlisted telephone number. Elderly people participate more frequently in the NKD.
Another key variable in traffic survey research is the average number of movements per individual per day. At 3.9 this figure was considerably higher in the OVG group, than the 3.2 in the NKD group. This difference is caused by methodological effects, over-reporting of trips by changing travel days and the non-response effect of the lower response rate. Over-reporting of trips happens when sampling days are replaced. This is typical reaction of respondents who are usually very mobile, but for some reason (e.g. illness), are housebound on the sample day. They tend to replace the original sampling day with what in their view would be a normal day, and thus report a higher mobility. This can easily be checked by the dates for the given and the reported sample day.
An important systematic error in mobility surveys is the effect of different response rates. It is well documented in the literature that the survey design used motivates people with a higher mobility to participate in the survey more than those with low or no mobility (Brög and Meyburg, 1980). In the NKD, a strict mail-back design is used, results can be analysed by the speed of response and following this well-known procedure the results of the NKD could be calculated for the same response rate. Even very mobile people can be better reached by the mail-back methods, as they too receive the questionnaire and can decide for themselves.
One should keep in mind that different survey designs show different results. However, accompanying method research – as done in this pilot exercise – can identify these effects, and so correct for them. For example, the OVG design applied a screening survey in which the respondents could decide whether they would participate in the actual survey or not. This "self-selection" has an underestimated effect on respondents' behaviour, resulting for example in higher mobility. In addition, the replacement of sampling days by the respondents also results in higher mobility. And last but not least a higher response rate means that a larger share of less mobile people are participating in the survey.
This pilot may also highlight another influence which is seldom taken into consideration: the effect of coding, its underlying principles and conventions. As Statistics Netherlands and Socialdata coded their data separately by their own standards, the differences could be identified in detail and they did indeed have an effect on the results.

The New OVG

On the basis of the positive experience with the NKD in the pilot study, the Ministry of Transport and Public Works and Statistics Netherlands decided to redesign the National Travel Survey based on the New Kontiv Design. We shall refer to this redesign here as the NOVG (New OVG). The redesign required the development of new questionnaires and operating procedures, following the

successful NKD approach as closely as possible. The NOVG trial started at the end of February 1998. Its purpose was to set up and prepare an efficient project organisation for the implementation of the NOVG and to gain experience with the new procedures and questionnaires.
As of 1 May, the project group started to run the final version of the basic questionnaire of the NOVG parallel with the old OVG. Subsequently satellite surveys were developed and implemented in the course of the year. The OVG and NOVG ran in tandem until the end of 1998, making it possible to quantify differences in the results of NOVG and OVG later in order to correct the existing series (since 1985) for the introduction of the new design. Since 1 January 1999, the NOVG has been fully operational and implemented.

Test NOVG

From the end of February until May, a test of the NOVG was conducted in co-operation with Socialdata. In consultation with the users of transport survey data, the questionnaires of the NKD pilot have been adapted. Questions were kept identical to those in the OVG where possible. One important difference compared with the NKD pilot was the addition of a question on income. As it was feared that this addition might have a negative influence on the response, the NOVG trial sample was split into two: half the sample received a questionnaire with the income question, the other half without. The results showed no significant impact of this difference on the level of response.

Table 4
Response rates Test NOVG

	With income question (%)	Without income question (%)
With telephone	76.5	76.1
Without telephone	33.3	35.9

The conclusions and recommendations resulting from the NOVG test are:
– The response in the test run was not quite as high as in the NKD pilot study. This is caused by
  - the premature termination of the NOVG test so that not all projected recall actions could be carried out, as the NOVG started to run parallel;
  - households without a known telephone number could not be sent personalised mail;
  - national response rates were considerably lower than the test regions of the NKD pilot. We expect the overall response to increase by several percentage points when the NOVG design is in optimal operation. The target is a 70% response rate.
– The differences in the response results between the samples with and those without the income question in the basic questionnaire are very small. As the question does not have a significant effect on the response results, it was decided to include it in the final design of the NOVG questionnaire. The item non-response to the income question in the NOVG test was slightly higher than in the OVG.
– The response for the part of the sample without a known telephone number is much lower than for households that could be called by telephone. In our experience households with unlisted numbers were slower to respond. This is largely because of the difference in procedure: the motivation calls seem to have a strong positive effect on response results. Two types of measures have to be considered in this respect. On the one hand, we have to find and implement ways to increase the response for households that cannot be reached by telephone. On the other hand, procedures have to be optimised to increase the proportion of households for which a telephone number can be found. For the NOVG test, this proportion was as low as 70%.
– Response for the traditional OVG has continued to drop since the NKD pilot study in September 1997.

Parallel run of the NOVG

On 1 May the NOVG started to run parallel to the traditional OVG. Unlike the NOVG trial, this time the GBA register was used as the sampling frame. This register is based on administrative personal registration of all individual citizens in all municipalities. The old sample frame (GBR) is based on all registered postal addresses in the Netherlands. The new sample frame meant that not only addresses, but also names were known, which facilitated personalised mail. Until the end of 1998 about one fifth of the sample of the OVG was approached using the NOVG design. By comparing the results of NOVG with those of the traditional OVG, we can quantify the effects of the change in survey design. The OVG results since 1985 will be corrected using the results of the design effect study.
The proportion of the sample households for which a telephone number could be obtained has been substantially increased to 80%, 10 percentage points more than in the NOVG trial. All households in the NOVG sample received a questionnaire in which the income question was included.
The conclusions and recommendations of the parallel run are:
– overall, response levels were better in both sample groups (with telephone about 80%; without telephone over 35%; total response over 71%). The use of a different sample frame (GBA for the NOVG) could have been an important factor, as it enabled personalised mailing of questionnaires.

Table 5
Response rates per month per mailing

	With telephone (%)	Without telephone (%)
First Mailing (questionnaires)	42–48	10–16
First reminder	60–66	18–23
Second reminder	71–75	21–28
Third reminder (questionnaires)	76–79	26–38
Fourth reminder	78–80	29–40

– The response level for the part of the sample that could not be approached by telephone falls short of the level obtained in the NKD pilot. This can be explained by the fact that the NKD pilot was not held nation wide, but in three southern regions of the country. In addition, the proportion of households for which no telephone number can be obtained is higher in large city areas like Amsterdam, Rotterdam and The Hague, cities not included in the NKD-pilot. Also, the general response level obtained in the large cities is below average. Compared with the NOVG test, the response for this part of the sample was higher.
– Despite the presence of some factors that may have a negative effect, the overall response is comparable with the response of the NKD pilot. The negative-effect factors are:
  - the NOVG parallel run is carried out nation wide as opposed to the three southern regions in which the NKD pilot was held

- the reporting period included some public holidays as well as the start of the summer holiday period in July. Looking at the response on a daily basis, it seems that days like Ascension Day and the Whitsun long weekend do indeed have a negative impact on the response level.

– The extra effort put into finding telephone numbers increased the percentage of addresses for which a telephone number was known to 80% of the sample.
– An overall response of at least 70% seems to be attainable.
– The overall costs of the new design (NKD) are about the same as for the old design (OVG).

Further plans

From 1 May 1998 the NOVG ran parallel to the traditional OVG in a ratio of 2 NOVG to 9 OVG sample units. On December 1998 the NOVG sample was increased to the normal sample size, and on 1 January 1999 the OVG design was abandoned completely. The results of the OVG for 1998 are based on data obtained using the traditional OVG design (Statistics Netherlands, 1999). The first results of the New OVG will be published on 1 May 2000. The OVG results since 1985 will be corrected for the effects of the introduction of the new survey design.

In 1998 satellite surveys were developed to collect data on children under six years of age, traffic accidents and the use of public transport.

The research design of the NOVG offers greater possibilities to comply with specific information needs and to tackle current issues by means of additional satellite surveys. In the future the satellite surveys can be expanded at the request of the users, for example to collect data on so-called “chain journeys”, the use of taxis, long distance travel, mobility of elderly people etc.

3. Conclusions

Substantially improved response levels

The NKD pilot of September 1997 produced higher response rates in all respects compared with the OVG control group. Total response at the household level was 74% in the NKD pilot and 44% in the OVG control group. The number of useful diaries (responding individuals) was 70% higher in the NKD pilot than in the OVG control group. For the NOVG test, in the NOVG parallel run and in the NOVG expanded sample, similar good response levels were obtained. Overall costs of the old and the new OVG design are about the same.

Change in composition of the response

The proportion of children under six was lower in the NKD pilot than in the control group. This was because the relevant satellite survey could not be conducted by telephone for part of the sample (approximately 30%). Asking for a telephone number (for unlisted numbers) and/or a mail recall procedure are being considered. Elderly people co-operated more often in the NKD than in the OVG design.

Data of comparable quality

Despite the use of simplified questionnaires, no loss of data quality could be detected. There are no essential differences in distribution, rounding errors and item non-response between the data of the NKD pilot and the data collected with the OVG-design.

Breach of trend in the mobility data

The proportion of respondents reporting no journeys on the reference day (non-mobile) is higher in the NKD data. The average number of movements per person per day also is lower in the NKD data, even after correction for the proportion of non-mobile people. In addition, the average distance travelled per person per day is lower in the NKD data. It is clear that the increased proportion of non-mobility that comes with the use of the NKD will cause a breach in the mobility data. Results of further analysis of the data from the parallel run will be published separately.

Corrections for trend breaches

For some key variables the use of the new survey design will lead to a breach in the series of mobility data that have been collected since 1985. This is not acceptable to the users of the OVG. We are currently analysing the significant differences in results between the OVG and NKD data. The outcome of this analysis, together with the results of similar investigations on the data of the NOVG parallel run, will be used to develop a method to “correct” the results of the old OVG. The idea is to find correction factors for the mobility data already collected using the OVG and to compute values for key variables, as they would have been obtained if the NOVG design had used. Thus, the breaches in trends in data series will be smoothed out for key variables. Results of the trend breach correction based on the collected data of the parallel run will be published separately.
For further information and copies of questionnaires or diaries, please contact Ger Moritz: gmrz@cbs.nl, or Werner Brög: socialdata@socialdata.de.

Note

1) Socialdata, Munich, Germany.

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Relationships between registered unemployment and response rates in the Labour Force Survey

Mark Huisman

Estimates of registered unemployment based on the outcomes of the Dutch Labour Force Survey (LFS) may be biased by selective non-response. Recent deviations in the unemployment rates are thought to be caused by fluctuations in response rates. This article examines the relationships between fluctuations in the monthly response rates of the LFS and fluctuations in the unemployment rates. The analyses show that there is a long-term connection between response and unemployment, but no causal relationship was found. No significant relationships were detected between the short-term movements in the series. After correction for trend and seasonal effects, again no significant relations were found. It is therefore concluded that fluctuations in the response rates do not lead to extra fluctuations in registered unemployment over and above the fluctuations caused by ordinary developments in unemployment rates.

1. Introduction

In recent years, the impression has emerged that the unemployment rate does not follow other labour market indicators as well as it should. The official estimation of registered unemployment is based on the outcomes of the Dutch Labour Force Survey (LFS), which is carried out monthly as a continuous survey. Now the suspicion has arisen that selective non-response is causing biased estimates of unemployment. Moreover, it has been suggested that fluctuations in the estimated unemployment rates are caused by increasing or decreasing response rates of the LFS.

Although the results of the LFS are partially corrected for the selectivity of the non-response, a certain amount of non-response bias will remain, because no correction procedure can eliminate it completely. Low response rates will therefore result in larger biases when estimating registered unemployment, and changes in the level of the response rates lead to fluctuations in the amount of bias that can be accounted for in the estimation. Changing rates of non-response may therefore lead to fluctuations in registered unemployment not caused by actual changes in unemployment rates. This article investigates the relationship between changes in the response of the LFS and fluctuations in registered unemployment.

2. Time series

Registered Unemployment

Statistics Netherlands publishes estimates of registered unemployment monthly. People are defined as being registered unemployed if they are aged 16–64, registered with an employment agency, do not have a job or work for less than 12 hours a week, and are immediately available to start a job of 12 hours or more a week. The employment office registration consists of people seeking employment, including those looking to change their job. Therefore, the registered unemployment rate indicates how many of the people registered in the employment office files are actually available for the labour market.

The labour market status provided by the register is not very reliable, however. Often someone will still be registered as being unemployed while he or she has already found a job. Since 1988, therefore, the registered unemployment rate is estimated with the aid of the continuous LFS. Every month, the number of unemployed persons is determined by linking the employment office files with the results of the LFS (Bierings, 1995). The sample totals from these linked data sets are weighted to represent population results, and are used as indicators of the short-term developments on the labour market. To prevent large monthly fluctuations from distorting the image, three-month moving averages are published. In this article, instead of the official three-month moving averages, the monthly figures are used to study the relationship between unemployment and the response rate. This series of monthly registered unemployment figures is referred to below as RU.

The Dutch Labour Force Survey

The Dutch Labour Force Survey started in 1987 and is designed to give detailed information on the Dutch labour market. It is a continuous survey in which about ten thousand addresses are approached every month. The results are used to distinguish the employed and unemployed population by linking the sample to the employment office files. For this purpose, the addresses that occur in the registers of the employment offices are oversampled (Statistics Netherlands, 1998a; Bierings, 1995). These addresses are called the ISVA sample (in Dutch: *Informatiesysteem Vraag en Aanbod*).

Table 1
Net annual response rates for the Labour Force Survey

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
LFST	59 [1)]	60 [1)]	59 [1)]	56.0	55.9	57.2	59.6	57.5	55.8	53.7
LFSD				56.7	56.5	57.4	59.9	57.9	56.2	54.4
ISVA				52.2	53.4	56.4	58.9	56.3	54.6	51.1

[1)] Official publications Statistics Netherlands.

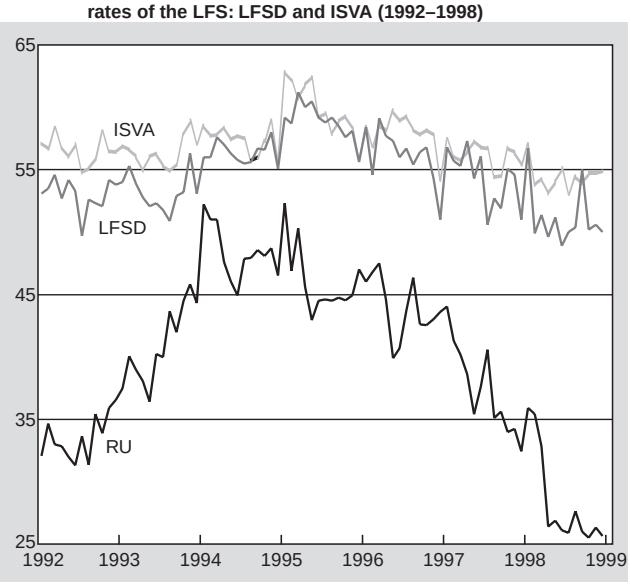
The series consisting of the monthly net response rates of the total LFS sample (called LFST here) consists of two sub-series, which are analysed separately in the following section. The first sub-series contains the response rates of the sample without oversampling of the addresses from the employment office files. Because this is a sample from the Dutch population in which some specific sub-population is not purposely overrepresented, it is called LFSD (LFS Dutch population) here. The second sub-series consists of the response rates of the ISVA sample, and will be referred to as ISVA. Table 1 presents the annual response rates of the three series.

The percentages in Table 1 are determined from the net sample, i.e., from the addresses actually visited. From the table it follows that the response in the total LFS sample has decreased sharply in the last few years: in 1995 it was almost 60%, in 1998 only 54%. The same is true for the two sub-series, of which the ISVA constantly has the smallest percentages.

Modelling time series

The monthly registered unemployment and the response in the LFS for the years 1992–1998 are illustrated in Figure 1. Both the series LFSD and ISVA are presented. From Figure 1 it follows that both response series show the same long-term development: the rates increase up to 1995, and decrease thereafter. The ISVA series is almost constantly lower than the LFSD, indicating that people registered in the employment office files participate less often in the LFS those not registered. Also registered unemployment seems to have basically the same long-term movement as the response series. The changes in the RU series, however, are much larger than those in the other two series. Seasonal patterns are visible, but are not very pronounced.

Figure 1. Monthly registered unemployment RU (10,000) and response rates of the LFS: LFSD and ISVA (1992–1998)



The small response percentages, especially those of the ISVA, give rise to the suspicion that non-response is selective with respect to the developments on the labour market. Fluctuations in the estimated unemployment rates are allegedly caused by changes in the response rates of the LFS. The resemblance of the long-term movements in the three series also seems to indicate a relationship between response rate and registered unemployment.

In order to investigate any relationship between registered unemployment and the net response rates of the LFS, the series have to be modelled with a statistical time series model. Time series consist of various components, like trends, which represent the long-term movements or seasonal patterns that repeat themselves more or less every year. The classical decomposition is usually a useful starting point in the modelling process:

observed series = trend + seasonal + irregular,

where the irregular component reflects the non-systematic movements in the series. However, more elaborate models may be formulated. A model of the series will need to capture these characteristics to provide a description of the series in terms of its most important components. The advantage of an explicit statistical model is that it has the flexibility to represent adequately the movements in the series, which may have different properties and may change over time. Structural time series models form one class of models that are set up in terms of these components. The components have a direct interpretation and can be made stochastic to reflect changes over time (see e.g. Harvey, 1993). The components can be estimated directly without the use of filters to smooth the series.

In the unemployment and response series, various components can be determined. The classical decomposition, however, proves to be the best fitting structural model (Huisman, 1999; see also van der Hoeven, 1997, for non-parametric modelling using filters to smooth the series and decompose it into the classical components). In all three series a stochastic trend is the most important component, and a fixed seasonal component is specified to model the small seasonal effects. Moreover, some intervention variables are included in the models to take account of outlying observations and structural breaks in the trends. These data irregularities may arise from specific events, and only those that were found to be very significant are included in the models.

3. Relationships between unemployment and response

The existence of any relationships between registered unemployment and response rates in the LFS is investigated with the help of three time series: RU, LFST and ISVA. In particular, the ISVA series is important because it contains the response rates of the persons registered in the employment office files. The response of the Dutch population (LFSD) is not inspected separately, but response rates of the total sample (registered and unregistered persons) are used instead. It should be noted that the LFST series combines both sub-series and the LFSD series is most influential in this combination because of its larger number of addresses.

Correlations

We need to model the time series as described in the previous section to prevent the acceptance of the existence of a relationship between registered unemployment and response rates, when this is in fact entirely spurious. Spurious correlations may emerge when the time series have means and variances which increase in time as a result of long-term trends or other movements (in this latter case of variances not being constant, one usually speaks of heteroscedasticity). Moreover, these (systematic) movements in time result in serially correlated residuals in the model of that series. If this is the case, the series are called non-stationary and ordinary correlation or regression analysis leads to spurious results. An important warning sign is an apparently acceptable correlation coefficient (or R^2 in regression analysis), coupled with a very low value of the Durbin-Watson (DW) statistic. This statistic is the traditional test for serial correlation between residuals of one model (see e.g., Stewart, 1991). For instance, the correlation between the

Table 2
Correlations between the series RU, LFST and ISVA. Unadjusted and adjusted series: S seasonal adjustment, T adjusted for trends, TS adjusted for both trend and seasonal patterns, TSI adjusted for trend, seasonal patterns and interventions. Correlations which are significant are printed in Italics (P<0.005).

	RU	S	T	TS	TSI	LFST	S	T	TS	TSI
LFST	*0.69*									
S		*0.73*								
T			0.10							
TS				0.04						
TSI					–0.09					
ISVA	*0.71*					*0.91*				
S		*0.75*					*0.91*			
T			0.07					*0.74*		
TS				–0.04					*0.64*	
TSI					–0.04					*0.48*

series RU and ISVA equals 0.71 (see Table 2; R^2=0.50), and the conventional *t* statistic to test the significance of the regression coefficient in the model in which RU is the dependent and ISVA the independent variable, equals 9.77 (P < 0.0001). This suggests a significant relation between the two series. However, the DW-statistic equals 1.01, which indicates seriously correlated disturbances that distort the analysis and lead to spurious results.

The true relationships between the three series will emerge when the series are adjusted for long-term and seasonal effects, as modelled with a structural time series model. Table 2 presents the correlations between the unadjusted and adjusted series, showing that spurious correlations exist between registered unemployment and the response rates. The strong relationships are caused by high correlations between the trends in the series. Seasonal patterns do not have a large effect on the correlation. Moreover, the correlations between RU and the response rates increase when the series are adjusted for seasonal effects. This is caused by some opposite seasonal effects; response rates tend to be higher in the spring, whereas registered unemployment decreases in this period. The adjusted series show negative correlations indicating that low response rates are associated with high registered unemployment. These correlations, however, are very small and not significant.

The correlations between the two adjusted response series are significant, but not very large. When interventions are not included in the models, the correlation is reasonably large (0.64), but when they are included the correlation decreases due to the more erratic behaviour of the ISVA series, which contains more outliers. This indicates a difference in response behaviour between respondents who are registered in the employment office files and those who are not.

Cross-spectral analysis – coherence

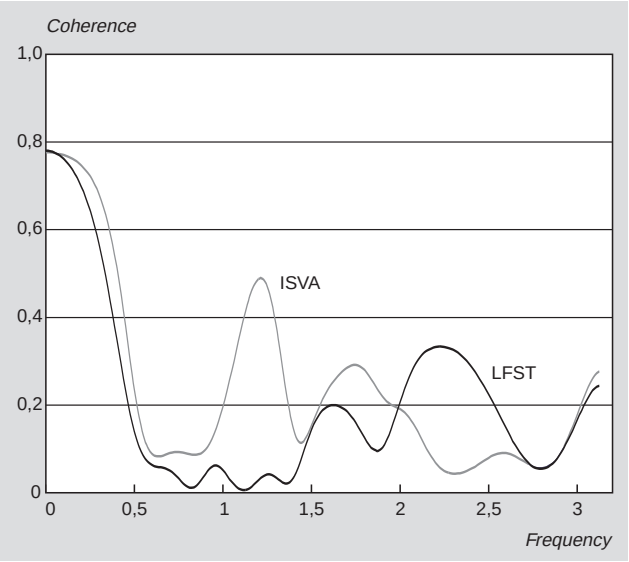
Using statistical models to analyse time series is known as analysis in the time domain of a series. Time series can also be inspected in the frequency domain, where interest is centred on the contributions made by various periodic components in the series. In the frequency domain, a series is considered to be the average of various regular cycles with different lengths (or periods). The *spectrum* of the series indicates the importance of each periodic component; it indicates the contribution of each component to the variation in the series. Therefore, the spectrum of a series is a tool to investigate the existence of trends (long cyclical movement) or seasonal components (cycles with a short period, for example 6 or 4 months). Regular cycles are in fact unusual in practice. What is usually meant by periodic components is a tendency towards cyclical movements centred around a particular frequency. See Statistics Netherlands (1998b) or Harvey (1993) for a more detailed discussion of spectral analysis.

Spectral analysis was actually used to distinguish the different components in the series RU, LFST and ISVA before they were modelled with a structural time series model (see Huisman, 1999). The spectrum of all three series showed that almost all the variance in the series could be attributed to low frequency components. The frequency is equal to the number of cycles in 2π time units and the period of a cycle, a related term, is the time taken to complete the cycle. Therefore, low frequencies are similar to long periods and high frequencies are similar to short periods (for example, a frequency of 2 corresponds to a cycle with period $2\pi/2 \approx 3$ months, and a frequency of 0.03 corresponds to a cycle with period $2\pi/0.03 \approx$ 200 months). The spectra of the series under investigation thus showed that long-term cycles, or trends, are the most important components of the series.

Spectral analysis can also be used to investigate the relationship between series, i.e. the relationship between the (periodic) components of the series for all frequencies. For this purpose the *cross-spectrum* of two series is computed, which contains all the information concerning the relationship between the series in the frequency domain. The relationship between two series is normally characterised by three quantities derived from the cross-spectrum, the *coherence*, the *gain* and the *phase*. The first quantity, the coherence, is a measure of the fraction of the univariate spectrum of the first series that can be systematically accounted for by movements in the second series. The value of the coherence is always between 0 and 1, and can be interpreted as a measure of the (squared) correlation between the two series at different frequencies. The coherence is therefore a tool to study the relationship between two series without the necessity of modelling the series. See Statistics Netherlands (1998b) or Harvey (1993) for a more detailed discussion about cross-spectral analysis and the estimation of the coherence. Figure 2 shows the coherence between the series RU and LFSD, and RU and ISVA.

From Figure 2 it follows that the coherence is largest at low frequencies, i.e. the long-term trend. This was also evident from the high correlation between the trends of the series. For higher frequencies (short-term cyclical movements) the coherence is relatively small and therefore negligible, except for two frequencies. First, a coherence of about 0.5 between RU and ISVA for frequency 1.2 (i.e. a cycle with a period of 5 to 6 months). Secondly, a coherence of 0.35 between RU and LFST for frequency 2.2 (i.e. a cycle with a period of 3 months). However, these values are not large enough to expect a large influence of response on registered unemployment.

Figure 2. Coherence between the series registered unemployment and response rate in the LFS: LFST and ISVA



The second measure, the gain, also characterises the relationship between RU and the response rates, but is dependent on the strength of the relationship as measured by the coherence. The gain can be interpreted as the regression coefficient for the regression of the component with a specific frequency of the series RU on the corresponding components of the response series. The last measure, the phase, indicates the amount of time the response rates are ahead of registered unemployment. A large positive phase therefore indicates that the RU series follow the response rates, and when the coherence is large, the response rate will be a good estimator of the registered unemployment. However, the population coherence has a large influence on the estimated coherence, gain and phase. The closer the coherence is to unity at a particular frequency, the better the estimates (smaller variances). On the other hand when the coherence is small, the estimated coherence, gain and phase may all be unreliable (Harvey, 1993; chapter 7). Given the coherence in Figure 2, both the gain and the phase for RU and LFSD, and RU and ISVA respectively are small, indicating no significant relationship. Moreover, the coherence is generally small which means that the estimates are very unreliable.

Causality – Granger causes

The small values of the phase already indicated that the response rates can hardly be used to predict registered unemployment. Only for the long-term component is the coherence large, but for these (low) frequencies the response rates hardly precede the unemployment rates in time, i.e. the phase is small. This means that there is no strong association between the series, except for the trends, and it indicates that changes in the level of the response rates do not cause changes in the registered unemployment. The causal relationship between the series can also be investigated in another – more direct – way by testing for *Granger causality* in the series.

The notion of causality is essentially philosophical and there is no general agreement about cause and outcome. In empirical econometrics the need for defining causality is clear: one simply wants to know whether, for example, a decrease in response results in an increase in registered unemployment, when otherwise they would not have altered. In econometrics, causality connotes 'prediction' rather than 'production'. The most widely used definition of causality is that of Granger (see Charemza and Deadman, 1992), which states that - in our case - the series LFSD is a *Granger cause* of the series RU, if present RU can be predicted more accurately by using past values of LFSD than by not using these past values.

This causality can be tested with a so-called Granger test. For this purpose a model should be estimated in which the series RU is a function of past values of RU, past values of the response rates and the time series components (trend and seasonals). See Huisman (1999) for a formal expression of this equation. Then, in the light of the above definition, if the coefficients of the past values of the response rates are not significant, the response rates are not a Granger cause of registered unemployment. This test is conducted with *F* tests for three lagged values of both RU, and LFSD and ISVA respectively. The results indicate that none of the null-hypotheses of zero coefficients can be rejected, which means that there is no evidence that the response rates are a Granger cause of the registered unemployment.

4. Conclusions

From the analyses it follows that the trends in both registered unemployment and the response rate of the LFS are correlated. A high positive correlation indicates that in the long run a high registered unemployment and high response rates coincide (and vice versa). No causal relationship between the two series was found, however. Cross-spectral analysis shows that in addition to a large coherence for low frequencies, the phase between the series is small and not reliable. This means that the response in the LFS hardly has any power to predict the values of the registered unemployment.

In the short run there is no significant relationship between unemployment and response. The coherence between the series is small and not reliable. Only in the ISVA series, which behaves more erratically than the LFSD series, is a small association found between response behaviour and registered unemployment. The predictive power, however, is negligible because the phase is very small and unreliable due to the small coherence. It can therefore be concluded that for the short-term movements, fluctuations in the response of the LFS are not related to fluctuations in the registered unemployment.

Both conclusions are confirmed by the small correlations that exist between the series when they are adjusted for the trends. The correlations were not found to be significant, and when adjusted for seasonal patterns, they even decrease and become negative. Inspecting the cross-spectrum of the adjusted series (not reported here) leads to the same overall conclusion. The coherence is never larger than 0.25, which indicates that the components in the series are hardly related and changes in the response rates cannot be used to predict changes in registered unemployment.

Although the series are related in the long run, there is no causal relationship between them. The series are even hardly co-integrated, which means that the large correlations between the trends do not imply a similar long-term movement, and certainly not a causal relationship. The Granger tests confirm this conclusion: the response rates cannot be used to make better predictions of the registered unemployment, and changes in the response rates do not lead to spurious fluctuations in the unemployment rates. Note that the non-response in the LFS varies between 50% and 60%, leaving a large, structural non-response of at least 40%. Biased estimates of the registered unemployment may be caused by this large core group of non-respondents. This group probably does not cause the observed fluctuations in the response, but the core group of non-respondents do cause the possible selectivity of the non-response and the resulting bias in the registered unemployment.

The analysis described here gives an idea of the developments in the response rates of the LFS and their relationship with registered

unemployment in past seven years. However, to give a more complete picture, possible causes of the (selective) non-response should be taken into account. For a better specification of the link between response and unemployment we need an insight into relationships between response and causes of non-response on the one hand, and between registered unemployment and causes of non-response on the other.

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Restructuring the Dutch Labour Force Survey

Kees van Berkel and Johan van der Valk

At the moment the Dutch Labour Force Survey (LFS) produces annual statistics on the labour market. In the last couple of years, however, the demand for detailed information on short-term trends has strongly increased. This is demonstrated by a recent Eurostat regulation on labour force surveys, according to which member states have to supply quarterly data.
With the current LFS sample design it is not possible to produce reliable quarterly statistics, and budgetary constraints preclude an expansion of the sample. For this reason a study was carried out to see if it is possible to produce reliable figures with a different sample design, without increasing the budget. A rotating panel with five waves turned out to be the most expedient way to obtain the figures needed.

1. Introduction

In the near future the Dutch Labour Force Survey (LFS) will produce quarterly as well as annual figures on employment and unemployment. Statistics Netherlands will thus meet the information needs of the main national and international users of labour market statistics, and fulfil the requirements stipulated in the Eurostat regulation on the labour force surveys.
At present the Dutch LFS is a cross-sectional survey with a monthly sample of some ten thousand households. As this number is too small to provide accurate quarterly figures, the sample would have to be enlarged extensively to produce reliable quarterly figures on unemployment and employment with independent samples. The costs this would involve, however, are too high. This article shows that with a rotating panel design reliable figures can be made without running into extra costs.
In a rotating panel respondents are re-interviewed a number of times. The number of re-interviews and the intervals between consecutive interviews make up the rotational pattern. Every month, the part of the sample that is re-interviewed for the last time is replaced by a new sample, thus fully replacing the sample population after a certain period. From 1993 to 1996 an experimental panel was incorporated in the Dutch LFS: one out of every ten LFS respondents were contacted by telephone three, six and twelve months after the initial face-to-face interview. In the study of the possibilities of a rotating panel design for the LFS, the experiences obtained from this panel turned out to be quite useful.

2. Reliability of annual and quarterly figures

Statistics on unemployment must meet certain demands of reliability. The *annual figures* must have at least the same standard error as the current annual figures. At the moment the annual figures have a standard error of six thousand, so the new design must guarantee this level of reliability. Since the main purpose of the *quarterly figures* is to monitor changes, the measurement of the change in unemployment from one quarter to another must be reliable. The minimum level of reliability is derived from experiences with the time series of the annual unemployment figures, which has proven to be very stable. At the moment the standard error for the annual change in unemployment is eight thousand. So if the new design guarantees that the standard error for the quarterly change does not exceed eight thousand, these figures are certain to be sufficiently reliable. The current cross-sectional sample design of the LFS could not provide this level of reliability: at 17 thousand, the standard error for the quarterly change is much higher.

In the same way as for the unemployment figures, the reliability of the figures on employment are ascertained. Again, the reliability of the annual figures must be guaranteed. As the standard error for the *annual figures* on employment is 14 thousand, the new rotating panel design will have to ensure a standard error below this figure. For the *quarterly figures* the standard error for the quarterly change may not exceed twenty thousand. This level is based on the current standard error of 19 thousand in the annual change. The current design does not achieve this level of reliability: at the moment the standard error for the quarterly change is 38 thousand.
The Eurostat regulation also contains requirements on standard errors for annual and quarterly estimates of unemployment, but the levels mentioned above easily meet these requirements.

3. Rotational patterns, sample size and reliability

For several rotational patterns the maximum sample size was calculated. The sample size is limited by budgetary constraints: the expenditure on the rotating panel may not exceed that on the

Scheme 1
Selected rotational patterns

Name	Number of waves	Quarters						
		q	q+1	q+2	q+3	q+4	q+5	q+6
Great Britain (GB)	5	x	x	x	x	x		
Italian (I)	4	x	x	–	–	x	x	
Dutch (NL)	4	x	x	x	–	x		
Great Britain plus (GB+)	6	x	x	x	x	x	x	
Italian plus (I+)	6	x	x	x	–	x	x	x
Dutch plus (NL+)	5	x	x	x	–	x	x	

current LFS including the experimental panel. For each of the selected rotational patterns standard errors for unemployment figures and for employment figures were calculated and subsequently compared with each other.

Rotational patterns

Six designs were considered. Rotational patterns developed in Great Britain and in Italy were selected from an inventory of LFS panel designs by Groot and Schobben (1997). In Great Britain households are interviewed five times at quarterly intervals. In Italy the pattern comprises four waves with successive intervals of one quarter, two quarters and one quarter. The rotational pattern based on the Dutch experimental LFS panel was also selected: four waves, three of which take place in subsequent quarters and the last two quarters later. Three more variations were created by including one or two waves. Scheme 1 presents the six selected patterns.

The rotational patterns differ in two aspects: the number of waves (four, five or six) and the length of the intervals between consecutive interviews. The GB and GB+ patterns consist of quarterly follow-ups. This maximises the sample overlap between two consecutive quarters and therefore minimises the standard error for estimates of quarterly changes, if the correlation is positive. The other sequences use quarterly follow-ups with one exception. One interval is extended to two or even three quarters, in order to increase the sample overlap between two consecutive years. Thereby the reliability of annual changes, if the correlation is positive, increases but the reliability of quarterly changes decreases.

Sample size

For each rotational pattern the maximum sample size is computed within the existing budgetary restrictions. As this maximum does not depend on the intervals between the interviews, but on the number of waves, the calculations were done for rotating panels with four, five or six waves. The following assumptions were made, based on experiences with the Dutch LFS and the experimental panel.

- When first included in the sample, households are interviewed face to face at their own home by an interviewer with laptop computer (computer-assisted personal interviewing, or CAPI).
- All follow-up interviews are by telephone (computer-assisted telephone interviewing, or CATI).
- Non-respondent households will not be re-interviewed.
- The initial household response is 60 per cent.
- After their first interview, respondents show a 78 percent willingness for a follow-up interview.
- The response in the i-th wave equals (91 + i) percent, i = 2, 3, … , 6.
- The average household consists of two persons.
- The interview length of the first interview is one hour per household, including an introduction of fifteen minutes.
- The duration of the CATI re-interviews is six minutes per household.

The duration of the initial interview is assumed to be the same as that of the present LFS interview. Re-interviews are assumed to take one minute per person longer than re-interviews in the experimental LFS panel, since the new CATI questionnaire is expected to be somewhat more extensive than the present one.

Table 1 lists the gross and net sample sizes for each rotational pattern. To make comparison with the current situation possible, the sample sizes of the current design are included. The table shows that the increase in waves decreases the number of CAPI interviews and increases the number of CATI interviews. Also the total number of interviews increases. If the current LFS design is compared with a rotating panel with five waves, we see that the rotating panel includes one third fewer CAPI interviews, while the number of observations is more than twice as large.

Reliability

For each design the standard errors are computed for the quarterly level, the quarterly change, the annual level and the annual change of the employed labour force as well as the unemployed labour force (Table 2), on the basis of the net sample sizes of Table 1. The column ‘norm’ indicates the permitted standard errors according to the reliability requirements mentioned in Section 2.

Table 1
Sample size (households) per year

	Gross sample size				Net sample size			
	LFS	Rotating panel			LFS	Rotating panel		
Rotational pattern		NL, I	GB, NL+	GB+, I+		NL, I	GB, NL+	GB+, I+
Number of waves	1	4	5	6	1	4	5	6
	x 1,000							
Wave 1	122	85	77	70	73	51	46	42
Wave 2		40	36	33		37	33	31
Wave 3		37	33	31		35	31	29
Wave 4		35	31	29		33	30	27
Wave 5			30	27			29	26
Wave 6				26				25
CAPI	122	85	77	70	73	51	46	42
CATI		111	131	146		104	123	138
Total	122	196	208	216	73	155	169	180

Table 2
Standard errors for the unemployed and employed labour force in various designs

	Norm	LFS	Rotating panel					
Rotational pattern			NL	I	GB	NL+	I+	GB+
Number of waves		1	4	4	5	5	6	6
	x 1,000							
Unemployed labour force								
Quarterly level		12	8	8	8	8	8	8
Quarterly change	8	17	10	11	9	9	9	9
Annual level	6	6	5	5	5	5	5	5
Annual change		8	6	6	7	6	6	6
Employed labour force								
Quarterly level		27	19	19	18	18	17	17
Quarterly change	19	38	20	20	14	15	16	13
Annual level	14	14	14	12	14	14	13	14
Annual change		19	16	13	17	15	13	16

Table 2 shows that in a rotating panel the figures turn out to be more reliable than in the independent samples of the current LFS. The reliability increases most in the estimates for the quarterly level and for the quarterly change of the employed labour force.

4. The selection of the rotational pattern

The annual figures meet the reliability requirements in each rotational pattern, as do the quarterly figures on the employed labour force. However, not all designs provide sufficiently reliable quarterly figures on the unemployed labour force, where the standard error for the quarterly change should not exceed eight thousand. In the rotational patterns with four waves (Dutch and Italian), the standard error for the quarterly change is ten thousand or more. This is too high and therefore these patterns are rejected. Only in the rotational patterns with five or six waves is the standard error for the quarterly change acceptable, at just above the norm of eight thousand.

On the basis of the standard errors alone for the employed and unemployed labour force, no further choice between the remaining rotational patterns can be made, as the errors differ too little. However, a rotating panel with five waves is preferred to one with six waves, as:

– the response burden is smaller with fewer waves,
– behavioural bias is less in a rotating panel with fewer waves,
– the number of households in the initial sample increases if the number of waves decreases, see Table 1. This enhances the possibility to monitor characteristics which do not change so much in time.

There are two rotational patterns with five waves: GB and NL+, differing only on the time between the third and fourth interviews. In the British pattern the interval is three months and in the Dutch+ pattern six months. The standard errors for the employed and unemployed labour force in GB do not differ significantly from the corresponding standard errors in NL+. The GB pattern is more elegant and easier to control, and therefore will be adopted in the future Dutch LFS.

In a five wave rotating panel the emphasis is on the CATI part of the survey (see Table 1). Every year more than 130 thousand households will be interviewed by telephone. As only 40 thousand people were interviewed by telephone in the experimental LFS panel, many more CATI interviewers will be needed. On the other hand as the number of CAPI interviews will be reduced from 122 thousand to 77 thousand a year, the burden on field interviewers will decrease.

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Land use Statistics in the Netherlands

Wim Lengkeek

1. Introduction

In autumn 1994 an article in *Netherlands Official Statistics* described land use statistics in the Netherlands and the means by which land use data are processed, the geographical information system (GIS). Since then the method used to collect and process land use data has been rationalised by the implementation of a new classification structure and the deployment of digitised aerial photographs.
However, developments have not yet reached a point at which the land use inventory system can be considered to meet requirements totally. Therefore continuous refinement of data collection processes to achieve better consistency and accuracy is considered to have a positive impact on the land use inventory system.
A next important step towards further rationalisation of the Dutch land use measurement system is the intended implementation of a digital topographical base map, produced by the National Topographical Agency (TDN), in the land use inventory process.
This article describes how Dutch land use statistics have evolved since 1994 and shows in which direction future developments will lead.

2. The 1996 method

Compared with the 1993 inventory, the method used for the 1996 land use inventory, which was completed in November 1999, had undergone two major adaptations. The first adaptation was the implementation of a classification structure along Eurostat and OECD guidelines, in order to make Dutch land use figures more comparable with those of other member states of the European Union. Co-ordination and harmonisation of land use data, enabling comparison of developments in the various EU regions, are of increasing importance in support of EU policy. Another advantage of the new classification is that more cohesion is achieved by grouping the separate land use categories more logically. The land use figures in this article are presented according to this new classification.
The second important adaptation was mainly driven by developments in technology and had a larger impact on the land use system. Each inventory is based on a set of aerial photographs covering the whole territory of the Netherlands. The flights are carried out from April until September and allow the land use statistics to refer to a certain year. While preparing the 1996 inventory, the technique enabling large-scale digitisation of aerial photographs became affordable. The use of digitised aerial photographs turned out to lead to greater efficiency in the land use measurement process. The aerial photographs are digitised and after geo-referencing fitted into a mosaic in which the photographs link up to each other almost perfectly. By showing the aerial photograph as an image on a PC monitor, with the digital land use map of the previous inventory projected on top of it, it is easy to visually detect the changes in land use. The next step is to record these changes. To be able to use digital images and to record land use changes ARCVIEW 3.0 software (ESRI, Redlands California) was chosen as the most appropriate tool.
The actual recording of the land use changes is carried out “on screen” according to the ARCVIEW data format principle. This principle requires data storage in the so-called SHAPE format. The land use features, consisting of objects describing the previous land use situation, label points and newly detected land use elements, are stored as separate themes or ARCVIEW 3.0 SHAPE files. After completing the SHAPE files covering a map sheet of 10 x 12.5 kilometres, they are transferred to a PC equipped with ARC/INFO 3.5, where they are separately converted to coverages and subsequently overlaid. Data referring to a certain year and considered redundant for analysis can be disposed of (temporarily) by dissolving the features concerned. The result is an ARC/INFO coverage containing the previous and updated land use situation.
The procedure described separates data-handling activities (the photo interpretation and recording of the land use changes) from the computerised processing of the recorded land use data. The entire production cycle as such is split into a pre-processing, handling and post-processing stage. This working method turned out to be very efficient, enabling an inventory to be completed in two instead of three years, with the same staff.

3. Land use accounts

At a minimum, land use statistics should result in a report describing the land use situation at a certain point in time. But perhaps of even greater importance is information about changes in land use. Accounts on changes of land use show which land use categories are diminished by withdrawal in favour of other categories in the period between successive inventories. So-called change matrices present this transfer of areas from one category to another for the Netherlands as a whole, but also for provinces; they can even be compiled at municipal level. As regional patterns in changes can be detected, these figures give an insight into the differences of spatial development between regions. Policy concerning spatial development can thereby be monitored.
To illustrate the above mentioned results, an example of both, the state of the land use situation (Table 1) as well as a change matrix (Table 2) are presented here, for a distinct part of the *Green Heart* area of the Netherlands (*het Groene Hart*). This part of the country has a mainly agricultural character although it is enclosed by the four largest cities in the Netherlands: The Hague, Rotterdam, Utrecht and Amsterdam. Because of its location, a restrictive policy has been developed to maintain the open and rural character of the area. The figures show clearly that this policy has not been very effective. Building activities show a degree of dynamics which do not guarantee the maintenance of an open or rural character. The built-up areas increased by 5.8 % between 1993 and 1996. Unfortunately a comparison with a figure on a national scale cannot be made at this stage. Compared with the 1.9% increase of built-up areas in the same period in the province of Limburg (Monthly Agricultural Statistics, December 1998), however, the development in the Green Heart illustrates the issue. Only significant changes are presented in the land use change matrix.

4. Data analysis with GIS

The potential of GIS as a data integration and analysis tool is still underestimated within the statistical discipline. Within such a system, data from various sources can be related, resulting in potential new approaches to certain phenomena. Although the techniques used for this kind of analysis, the so-called ‘overlay’ techniques, are more or less standard GIS procedures, they can reveal characteristics of data from different sources which would not become obvious without the use of GIS. So by simply using GIS procedures, data from different sources can be upgraded and new

Table 1
Land use in 'Het Groene Hart'

Group-Number	Category	1993	1996	Change
		ha		*%*
1	**Agriculture**	139,950	138,878	–0.8
11	Glasshouse horticulture	1,204	1,288	6.8
12	Other agricultural use	138,746	137,592	–0.8
2	**Forests**	3,123	3,321	6.3
21	Forests	3,123	3,321	6.3
3	**Built-up areas**	11,406	12,063	5.8
31	Residential areas	8,454	8,814	4.3
32	Mineral yielding	97	143	47.4
33	Industrial areas	1,914	2,133	11.4
34	Consumer services and office parks	167	176	5.4
35	Other public services (utilities)	320	336	5.0
36	Social, cultural and medical services	454	460	1.3
4	**Traffic and transportation**	6,179	6,249	1.1
41	Railways	571	583	2.1
42	Paved roads	5,443	5,505	1.1
43	Unpaved roads	111	107	–3.6
44	Airfields	54	54	0.0
5	**Recreation**	3,432	3,644	6.2
51	Parks	413	436	5.6
52	Sports fields	1,116	1,231	10.3
53	Non-residential recreation	933	986	5.7
54	Allotments	355	357	0.6
55	Residential recreation	615	634	3.1
6	**Natural areas**	2,972	2,874	–3.3
61	Natural drylands	133	118	–11.3
62	Natural wetlands	2,839	2,756	–2.9
7	**Other land use**	1,083	1,064	–1.8
71	Dumping grounds	75	70	–6.7
72	Wreckage yards	14	14	0.0
73	Cemeteries	144	150	4.2
74	Building sites for industry	213	158	–25.8
75	Building sites for other purposes	480	516	7.5
76	Other areas	158	157	–0.6
8	**Water bodies**	15,809	15,861	0.3
81	IJssel lake	129	123	–4.7
82	Water reservoirs	131	131	0.0
83	Recreational water bodies	159	158	–0.6
84	Water and canals >6 metres	15,390	15,449	0.4
85	Wadden Sea, Eems and Dollard	–	–	–
86	Eastern and Western Schelde	–	–	–
87	North Sea	–	–	–
Total		183,954	183,954	

dimensions observed. Unfortunately, most of the time statisticians are preoccupied with statistical production processes and related problems, and therefore tend initially to ignore relatively new tools and techniques. Nevertheless awareness of GIS is sure to increase as Eurostat and UN/ECE both have programmes to establish more awareness; in the near future, too, data will be more often explored using powerful data integration and data analysis tools like GIS. Statistics Netherlands is well on its way in the application of GIS, not only for collection and storage of geo-information, but also for data analysis and mapping purposes.

5. Future developments

The next challenge is the possible integration of TOP10VECTOR, the digital topographical base map produced by the National Topographical Agency (TDN), and the digital land use map. This topographical base map contains information on land cover in the Netherlands and has a geometrical accuracy on a scale of 1:10,000. Although integration seems a logical step, there are some problems that have to be solved before the actual integration process can be started. The first problem is related to the update cycle of the topographical base map. At the moment one quarter of the territory of the Netherlands is updated every year. This means that land use statistics compiled by means of the topographical base map do not allow publication of land use accounts for the national territory as a whole at a certain point in time. To accomplish some sort of compensation for this omission a sample strategy has to be developed to enable at least an estimate for the whole territory. What is encouraging is that at the moment of writing, a discussion is in progress between the Ministry of Housing, Spatial Planning and Environment, the Ministry of Finance and the Ministry of Home Affairs to establish a two-year update cycle of the topographical

Table 2
Changes in land use in 'Het Groene Hart' between 1993 and 1996

Withdrawn from	Added to																		Total
	1	of which	2	3	of which		4	of which	5	of which		6	of which	7	of which		8	of which	
		12			31	33		42		52	53		62		74	75		84	
	ha																		
1.	100	9	129	307	151	89	37	31	124	80	11	15	15	480	72	398	60	60	1,251
of which																			
12.	91		129	306	150	89	37	31	124	80	11	15	15	480	72	398	60	60	1,241
2.	3	3		–	–	–	–	–	1	1	–	18	18	3	–	3	1	–	26
3.	1	1	–	3	1	2	1	1	–	–	–	–	–	3	–	3	–	–	7
of which																			
31.	1	1	–	1		–	0	0	–	–	–	–	–	1	–	1	–	–	2
33.	–	–	–	–	–		1	1	–	–	–	–	–	–	–	–	–	–	1
4.	1	1	–	1	1	–	5	5	–	–	–	–	–	5	1	5	–	–	12
of which																			
42.	0	0	–	1	1	–	–		–	–	–	–	–	5	1	5	–	–	6
5.	12	12	10	5	4	1	1	1	20	–	4	–	–	7	–	1	–	–	55
of which																			
52.	3	3	–	3	3	–	1	–	–		–	–	–	1	–	1	–	–	8
53.	–	–	10	–	–	–	0	0	13	–		–	–	6	–	–	–	–	28
6.	42	42	82	–	–	–	–	–	4	4	–	–	–	–	–	–	3	3	131
of which																			
62.	42	42	72	–	–	–	–	–	–	–	–	–		–	–	–	3	3	116
7.	15	14	2	347	205	127	38	30	114	36	64	–	–	7	–	6	1	1	524
of which																			
74.	0	0	–	126	–	126	0	0	–	–	–	–	–	–		–	–	–	127
75.	9	8	2	219	205	–	38	30	109	36	64	–	–	1	–		1	1	379
8.	6	6	1	0	0	0	0	0	4	1	3	0	0	1	0	1	6	6	19
of which																			
84.	5	5	1	0	0	0	0	0	4	1	3	0	0	1	0	1	–		12
Total	179	87	224	664	363	219	81	68	268	123	82	33	33	505	72	415	72	71	2,026

[1)] Provisional results, based on municipal boundaries from 1996.

base map instead of the present four-year cycle. These three departments need the base map for a variety of tasks, and have a strong need for a more consistent and timely map. This discussion may pave the way to a more suitable update scheme.

The conversion of land cover, as given by the topographical base map, into the functional elements required to describe the land use situation can be realised fully automatically for some 90% of the surface area. The remaining 10%, however, mostly urban and semi-urban terrain, has to be interpreted visually from aerial photographs and is the most time consuming part of the territory. Nevertheless a significant reduction of the effort involved in the conventional method can be achieved, because the topographical base map provides 98% of the outlines required for distinguishing and mapping the land use situation.
A second obstacle on the course to integration is the copyright of the topographical base map. Up to now the digital land use map could be supplied to Statistics Netherlands' users of land use data. At this stage it is not certain whether this service will be hampered by the copyright policy of TDN.

Another ongoing development arises from the growing demand for recent and regularly updated data on forests and natural and countryside areas. Until now the compiled land use information has contained only marginal data on these elements. Statistics Netherlands plans to extend the data on these areas in co-operation with the Ministry of Agriculture to provide potential users in the field of environmental statistics and studies with a digital base map concerning forests and natural and countryside areas. A pilot study was scheduled for the second half of 1999 and should result in a report on the method and financial feasibility of such a base map.

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The Dutch standard classification of education 1998

Mies Bernelot Moens

1. The history of the Dutch standard classification of education

The first standard classification of education, or SOI (the abbreviation of its Dutch name: *standaard onderwijsindeling*) was introduced by Statistics Netherlands in 1978. It was the first Dutch classification to cover all types of education and training programmes by level and field of study. The classification by level was based on the International Standard Classification of Education (ISCED 1975) and fitted to the education system in the Netherlands. The classification by field of study differed from the ISCED (see Section 3).
The contents of the SOI - the education programmes - were updated regularly, and since 1995, when the annual release on diskette started, they are updated yearly.
The SOI is also used by institutions outside Statistics Netherlands in surveys and registrations of staff, vacancies and job seekers. The SOI also served as a criterion for Statistics Netherlands' standard classification of occupations: the level and the sector of an occupation are in most cases specified by the level and the field of study of the most suitable programme in terms of the SOI.
Within Statistics Netherlands, the SOI is mainly used to classify the education of the population (enrolment and attainment), which is a factor in nearly all sample surveys.
In 1998 Statistics Netherlands published a revised SOI on CD-ROM. In addition to the yearly update of programmes, level 4, *education at the second level, second stage*, was divided into three sub-levels. There were a number of reasons for this subdivision. First of all the number of programmes at this level had increased enormously, and there was a substantial disparity in programme durations. Another important reason was that nearly half the labour force were classified as having attained level 4 education, indicating the shortcomings of the classification in its discriminatory power at this level. Lastly, the system of vocational education and training was overhauled at this level and at the top of level 3. The new subdivision enabled the integration of the effects of these reforms.

2. The classification structure

Code system

The present SOI 1998 consists of a nomenclature systematised by means of *system codes* containing six digits. The first two digits indicate the level (1-7) and sub-level (for level 4: sublevels 1-3; the other levels carry a 0 = no sub-level) of a programme. The remaining four digits indicate the fields of study or training, which are divided hierarchically into 15 sectors, 27 sub-sectors, 149 groups and 350 minor groups. Identical fields of study carry the same codes within the different levels and sub-levels, but not every field exists at every level. The existing combinations of the codes of minor groups of study and levels generate the 1,141 different codes of the minor classes of the SOI classification. These minor classes are filled with a total of approximately 11,000 names of present and former education programmes.
Each of these 11,000 programmes has a *programme identity code,* which is assigned to respondents' answers to questions on education and training programmes they have taken part in and/or completed. The identity coding is computer assisted and takes place once the response has been received. In a subsequent stage these codes are linked up automatically to a SOI system code or an ISCED code. The identity codes also link up with other characteristics of programmes, such as the code of necessary preceding education, whether the programme is full-time or part-time, type of educational institution (public/private, dual system, correspondence), which may be used to derive ISCED variables or to make other types of analyses.
The programme identity codes play a key role because they show exactly which programmes tie in with the system code of the SOI or of the ISCED. Also when the classification itself changes, the identity codes stay the same, which facilitates the conversion to a new classification and the application of a new classification to already existing data. The only thing which will be needed in that case is an updated key from the identity code to the system codes.

Levels of education

The SOI distinguishes the following levels:
1. Education preceding the first level (usually 2 years)
2. Education at the first level (6 years)
3. Education at the second level, first stage (3 or 4 years)
4. Education at the second level, second stage
   - 4.1 Short programmes (up to 1 year)
   - 4.2 Intermediate programmes (between 1 and 3 years, full-time equivalents, cumulative at level 4)
   - 4.3 Long programmes (3–5 years)
5. Education at the third level, first stage:
   - higher professional programmes accessible to those having completed at least level 4.2 general programmes or 4.3 vocational programmes (1–4 years)
   - university programmes leading to intermediate university degree (nowadays 1 year) or a bachelor's degree
   - other programmes to be preceded by general education at level 4.2 or vocational education at level 4.3
6. Education at the third level, second stage; mainly programmes leading to a first university, master's, degree (3 to 4 years from the intermediate degree at level 5)
7. Education at the third level, third stage; doctorate and other post-graduate programmes (1 to 3 years).

In most cases, programmes at level x+1 require successful completion of a programme at level x. But programmes with a very short duration (in full-time equivalents) which require the successful completion of a certain level x of education are usually classified at the same level x and not at level x+1.

Fields of study

The criterion for the classification of field of study into sectors and sub-sectors (see above) is the *objective* of the programme, in terms of the sector of society or science at which the programme is directed. This objective is based on the total range of subjects of a programme. This criterion was chosen for reasons of stability: because of the changing contents of occupations, subject matter contents of education programmes tend to shift more and more often than the sector at which the programmes are directed.
For instance a training programme for marine engineers incorporates learning general engineering skills as well as special maritime applications, i.e. courses on ship machinery and navigation. Such a programme is directed towards transport; the programme is hence classified in the sector *transport, communication and traffic programmes* (40), sub-sector *transport, communication and traffic programmes with technical instruction* (42).

The SOI distinguishes the following sectors of fields of study:
00 General programmes
05 Teacher training
10 Humanities
15 Theology
20 Agriculture
30 Mathematics and natural science
35 Engineering
40 Transport, communication and traffic
50 Medical and paramedical programmes
60 Economics, clerical and commercial programmes
70 Socio-cultural programmes
80 Personal or social care
85 Fine arts
90 Public order and civil security
95 Other programmes

Sectors 20, 35, 40, 50, 60, 80 and 90 are further broken down into different sub-sectors consisting of combinations of sectors. For example, one of the sub-sectors of 40 is *transport, communication and traffic programmes* combined with *personal or social care* (80). This sub-sector contains for instance programmes to train stewards. Other sub-sectors are formed from 40 combined with 60, and 40 combined with 35. Other sectors, such as 20, 50 and 90 have combinations with 35, 60 and 80.
Each sub-sector is divided into groups and minor groups by the subjects of the programmes, making it possible to accommodate programmes pertaining to only one sector as well as those pertaining to more than one sector. Without such a system multi-sector programmes are usually difficult to code. The possibility of grouping programmes in different ways makes the classification flexible, and facilitates the conversion to ISCED fields of study.

3. The relationship between SOI and ISCED

As mentioned above, the SOI has an explicit link with the ISCED 1975. The ISCED 1975 has now been replaced by the ISCED 1997, which has a different structure of levels and incorporates more characteristics of education programmes than its predecessor and the SOI. Statistics Netherlands has drawn up a conversion key between its programme identity codes and the scores on the variables of the ISCED 1997. [1)] It is now possible to produce results of every statistical survey by ISCED 1999.

The SOI classification by field of study differs from the ISCED. The classification criterion of the major fields of the SOI is the sector of *society* at which a programme is directed, and if it is not directed at a sector of society, then the field of *science.* The major fields of the ISCED are based on main *subjects* of programmes. This means, for example, that in ISCED all management training programmes are in the same major group, while in the SOI they appear for every sector of society or science where there is some form of management training.

Correspondence between ISCED 1997 and SOI 1998

Code ISCED 1997	Code SOI 1998
0	1
1	2
2a/b/c	3
3a	4.1, 4.2, 4.3
3b	–
3c	4.1, 4.2
4a	4.3, 5
4b	5
4c	4.2, 4.3, 5
5a	5, 6, 7
5b	5, 6
6	7

4. Advantages of the SOI

The SOI system has the following advantages:
- It includes all kinds of programmes: general, vocational and recreational, regular, part-time, correspondence and short courses from 12 periods (=morning, afternoon or evening).
- It is and can be used for different purposes: survey coding (personal education, vacancies), statistics on graduates and enrolment, registration of vacancies and job seekers and staff administration.
- The SOI classification by level corresponds to the levels in the national education system, while ISCED levels often cover more than one national level.
- The SOI classification of fields of study into sectors and sub-sectors clearly distinguishes programmes directed at a single sector of society or science from those directed at two or more sectors. ISCED does not make such distinction.
- Since around 1993, each programme has kept the same identity code since its inclusion in the SOI. This unique code is linked to a SOI system code and an ISCED system code, making it possible to trace programmes even after classification changes and to show which programmes belong to which classification group of programmes (identified by the system code).
- The use of programme identity codes also facilitates ordering according to other classifications, such as the ISCED 1997. The present ISCED needs to cut through the minor classes of the SOI.

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Note

1. This key has been entered in the 1999/2000 edition of the SOI 1998 CD-ROM for the first time. The key is also applicable to 1998 and 1999 data.

Institutional

Statistics Netherlands celebrates its centenary

Jacques van Maarseveen

Statistics Netherlands has been celebrating its 100th anniversary in 1999. Against the background of its centenary a joint conference of DGINS (Directors-General of National Statistical Institutes of the current and future member states of the European Union) and IAOS (International Association for Official Statistics, a section of the International Statistical Institute) was organised in the last week of May 1999. On the last day of the conference, 28 May, the official centenary commemoration took place in the Knights' Hall in The Hague, attended by Queen Beatrix. On this occasion Statistics Netherlands presented some publications especially compiled for this celebration.

1. *Het huis der getallen* (The house of figures)

With the realisation of how important independent official statistics are for the functioning of democracy and society in general, at the end of the last century the Dutch government created a centralised institution to collect information and publish statistics on the Netherlands: the Central Bureau of Statistics (CBS), or Statistics Netherlands, as it is now known in English. When the CBS was founded by Royal Decree on 9 January 1899, its task was specified as follows: "Within the limits imposed by the available financial means, the Central Bureau of Statistics shall gather, process and publish all statistical information which the Director considers useful for practical or scientific purposes." However, there was the following caveat: "The Bureau cannot undertake any new statistical enquiries, issue new publications, or discontinue existing enquiries and publications without the consent of the Central Commission of Statistics (CCS)."
It was the CCS that determined the programme of work for the CBS and could issue orders in this respect. The Royal Decree of 1899 remained in force for almost a century and the new CBS/CCS Law of 1996 in essence reaffirmed the task and the formal relationship between the Bureau and the Commission.
Statistics Netherlands falls under ministerial responsibility for its budget, initially this was the Minister of Home Affairs, but since 1932 it has been the Ministry of Economic Affairs. This relationship always comes under strain when the budget is tight. There have been times when the Bureau faced such enormous cutbacks that its very existence came into danger, with the added threat that ministries would take on the statistics discontinued at the CBS, thus inflicting a blow to the effort to centralise official statistics. There have also been conflicts between the CCS and CBS, involving cabinet ministers, over attempts to intervene in statistics. In spite of this, the CCS and CBS have always been able to maintain their independence.
How official statistics in the Netherlands in the twentieth century were centralised, is the main subject of *Het huis der getallen* (The house of figures), an institutional historical study by Anne-Marie Kuijlaars of the Centre for Business History of the Erasmus University in Rotterdam (in Dutch with an English summary).
The author addresses this issue by placing the CBS in the context of the major historical processes and developments in the Netherlands in the period 1899–1996. She concludes that the CBS has diligently applied itself to its task of putting into practice the statistical policy of the government, as did the CCS with its "umbrella and parliamentarian" responsibilities.
Nevertheless, says Kuijlaars, there has always been criticism. The CBS has been depicted as a factory of figures, and as a self-centred, bureaucratic organisation of "obsessed number crunchers". According to her findings, the centralised organisation of the Bureau turned out to be crucial for how the public rated the degree of reliability and independence of the official statistics. She illustrates this by comparing the Dutch situation with the history of the organisation of official statistics in Great Britain. The discussion in Great Britain has clearly revealed the social and historical relevance of a study of the institutional aspects of official statistical organisations. In the Netherlands the CBS, as a centralised organisation, could clearly be distinguished from the rest of the government: it was a clear and well-known centre for users and suppliers of statistical information. That made it vulnerable to criticism.
The British example, says the author, shows how important it is to keep politics and statistics apart. The organisational proximity of the statistical institution to other government services has caused many problems, especially in the l980's. Statistics gained a bad reputation when people started to doubt the reliability of the statistical organisation. Independence of the organisation and reliability of the figures turned out to be crucial concepts in the histories of the statistical bureaux in the Netherlands and Great Britain.
The final conclusion of the study is that the structure of the organisation in the Netherlands functioned well, despite the difficulties that arose from time to time concerning the centralisation process, and the conflicts with the various parties involved in this process. However, in the Netherlands, too, complete independence of official statistics remains a myth. The Ministry of Economic Affairs handles the financial policy, and this has always determined the degree of independence the CCS has in setting up the statistical working programme of the CBS. Moreover, "Brussels" has reduced Dutch autonomy in the area of statistics even further in recent years.

2. *A century of statistics*

One aspect of statisticians' work is the struggle to provide a statistical description of reality while fulfilling the wishes of the users of this information. *A century of statistics* explains the problems posed by the presence of conceptual, methodological and organisational dimensions to such a description. The book does this for six important fields of statistics for which the CBS has been responsible through the years.
Part 1 deals with the aspects of *gathering, processing and publishing*, focusing on data about individuals, households, enterprises and institutions, including government bodies. It shows, for instance, how - after fierce debates - direct statistical observation of enterprises was introduced during World War I, and how it slowly evolved.
The direct observation of individual data was initially restricted to the population census held in principle every ten years, and a budget survey. After World War II other surveys were introduced on a limited scale. The surveys became more frequent in the sixties, and came into their own in the decades that followed.

The processing and publication of the collected data requires checking and coding procedures. In 1916 the CBS introduced the

first form of mechanisation, and some forty years later acquired its first computers. Mechanisation, automation and information technology have been instrumental in statistical developments. They have enabled methods of data gathering that have had a major impact on the distribution of information. Data dissemination is a very interesting topic in itself, including not only the publication of regular books, but also advanced new methods of data transfer.

A key issue in the statistical process is the guarantee of confidentiality. Respondents have to be sure that the information they provide will remain absolutely confidential during the entire statistical process, including data publication. Confidentiality is a *sine qua non* for national statistical institutes. The book outlines developments at both the CBS and the European Union.

The second part deals with *co-ordination, classification, and integration*. One of the original objectives in founding the CBS was to unify government statistics. However, for decades this task was limited to the improvement of individual statistics.
After World War II, the statistics were gradually harmonised. The co-ordination of economic statistics was closely related to the statistical integration effected after 1945, resulting in the National Accounts. Indeed, the Netherlands was one of the first countries to have National Accounts because of this centralisation effort.
The co-ordination of social statistics has also mainly taken place since 1945.
Also, the regionalisation of Dutch statistics deserves to be mentioned in this respect. The CBS has regionalised national statistics by dividing the Netherlands into regions and areas on several levels, and using these to describe differences and cohesion between the regions.

Co-ordination is important for the *integration* of statistics into a system of accounts that provides a coherent statistical description of social phenomena. After 1945 the integration of the economic statistics resulted in the System of National Accounts, and in the Regional Accounts in the late fifties. Partial integration frameworks for social statistics, such as the labour accounts and the socio-economic accounts were realised in the eighties.

Part 3 deals with the *general censuses.* These general censuses and surveys carried out by the CBS have played a very important part in obtaining basic statistical data. Moreover they have made their mark on the methodological approach of the CBS, especially in the case of the censuses, where the population of the statistical units, such as persons and enterprises, was in observed in full. The Population Census was the source of all key population data for years and included every resident in the Netherlands. The CBS' image was almost entirely determined by this Census from the very first one in 1899 to the last one in 1971. At certain intervals, the Population Censuses also included a census of occupations and a housing census. This part of the book addresses the methodological, organisational and political developments of the Population Census, and how data were obtained when it was abolished in 1971.

The Business Censuses also constituted a major source of data. In principle these censuses covered all Dutch companies. This part of the book tells us why it took so long for a business survey to be introduced in the Netherlands in 1930, and what happened after the last one in 1978?
Another major census dealt with the imports, exports, and transit trade used for the international trade statistics. Until recently it included all enterprises involved in international trade. The foreign trade statistics, which started in the nineteenth century, have had a rather turbulent history, especially since the creation of the European Union.

Before the first Business Census took place in the Netherlands, in 1930, there had been several Agricultural Censuses in which all agricultural holdings were observed. The long evolution of the Agricultural Census is reflected in this description of its various methodological aspects, showing how closely its history depended on the institutional environment, such as the Ministry of Agriculture, the FAO, the Benelux and the European Union.

Part 4 deals with the calculation of *indicators,* another major task in official statistics. The indicators are used as a benchmark for economic and social phenomena, such as production, population growth, consumer prices etc. In the thirties, the pioneering work by Jan Tinbergen at the CBS was crucial in their development. In later years the economic indicators were shaped by the progress in the National Accounts and, in the eighties, the Quarterly Accounts. As such they are part of the intended statistical integration, an aim shared by the social statistics. In the seventies, the CBS, working together with national statistical institutes in other countries, studied and set up a number of social indicators. Here the continuous quality of life survey developed by the CBS plays a role of its own.

Part 5 deals with the role *mathematical statistical research* has played in the history of the CBS. Mathematical research really came into its own with the arrival of Jan Tinbergen in 1929. Tinbergen hired a number of people with whom he laid the foundation for much of the later statistical work, such as the econometric studies carried out by the CBS, the development of the national accounts and sampling techniques.
The first sample survey was held after 1945, and was led by Dik Derksen. Various topics are put in into historical perspective, such as the contributions to sampling in space and time by Jan Vos, and the problem of non-response.
The mathematical contributions to statistical work on price indices by Jan van IJzeren in the fifties were internationally important developments. His contributions involved the calculation of purchasing power parity, an index number showing the relative price differences between the various countries. Van IJzeren's contribution is placed in the context of the general theoretical developments in this field, by comparing his method with those of Geary-Khamis and Gerardi.

The final part of A *century of statistics* is dedicated to *international statistical developments.* Since the first directors of the CBS were very interested in international statistical developments, the CBS has been involved in them right from the start. Numerous international contributions have been made over the years by CBS staff. The location of the Permanent Office of the International Statistical Institute (ISI) in The Hague since 1913 has also been important for the international role of the CBS. This chapter examines the relationship in the past and present of the CBS with the League of Nations, the United Nations, the Benelux, the ISI, the OECD and the European Communities. These bodies have greatly influenced the CBS working programmes over the years, especially since 1945. Statistical co-operation, co-ordination and support have been key elements in the international work of the CBS as the history of its first century shows. They are likely to remain just as important in the future.

3. *A century rounded up*

This book has a special place among the other more scholarly publications on the occasion of the centenary of CBS. It highlights a number of important aspects of the history of Statistics Netherlands in word and illustration, and also speculates on the future. The book includes many photographs and illustrations reflecting the history of the CBS. Under the title of *Looking at the century* an essay is made in images of this fascinating history.

First of all the book contains an overview of CBS history, especially of the development of the organisation. It is a story of ups and downs with periods of expansion, cutbacks and recovery. Before the foundation of the CBS in 1899, government and parliament

considered statistics as an unnecessary luxury, a notion that was to raise its head again, certainly whenever the government found itself in financial straits. Until the thirties, there were complaints from other countries about official Dutch statistics, but step by step the CBS has gained a sturdy international reputation since then.

Another topic covered by the book is the development of statistical data collection and dissemination. The whole statistical process of gathering and processing has had a long and sometimes turbulent history, the latter particularly in the last decades. Many different sources have been used in the past: population registers, customs forms, censuses, surveys, aerial photographs, files etc. The use of data processing equipment has played an important role in the history of the CBS. There has been a slow but steady increase in the amount of office machinery: from enumerating, punching and sorting machines to large mainframes, desktop computers, PCs and notebooks.
The results of a century of gathering and processing data have been published in books and journals, which side by side would take up more than 500 metres of shelves. The main publications are reviewed in *A century rounded up.* The CBS has continually sought modern methods to serve its users adequately and cost effectively with as much continuity as possible. Less expensive reproduction techniques, the telephone, the press and the Internet have all supplemented one another.

The development of economic and social statistics in the Netherlands is also outlined. The business census is used to show how economic statistics gradually evolved into a coherent set of National Accounts. Similarly, the population census is used as a basis for the description of social statistics. For the core of social statistics is counting people, and the oldest way to do this is the population census. Special attention is paid to the alternative sources for the general population census: existing registrations, administrative records and surveys. A virtual census will result from combining these sources, yielding once again a database covering all Dutch citizens.
The economic and social history of the Netherlands is illustrated by a description of each decade with the aid of a statistical indicator that is typical of that decade. For instance, indicators on housing, crime, production, household spending, quality of life, manure production, inflation and interest rates. This gives a kaleidoscopic view of the Netherlands over the years.

Since its inception in 1899, the Central Bureau of Statistics has been very active in organisations for international statistical co-operation. The book describes how these contacts allowed the CBS to develop into a prominent statistical bureau with a great deal of international influence. Lastly, it looks to the future. A delicate matter. Statisticians know just how difficult it is to describe what happened in the past, but that is their job and they do it every day. As predicting the future is not part of their job description, the story here is a fairy tale with a mystery ending.

4. *Nationaal goed. Feiten en cijfers over onze samenleving (ca.) 1800–1999* (Facts and figures about Dutch society, 1800–1999)

This book (in Dutch only) contains contributions from authors both inside and outside Statistics Netherlands covering social and economic developments in the Netherlands in the last two centuries. The articles reflect long-term developments and stress the value of historical time series of Statistics Netherlands, sometimes placing the Dutch situation in an international perspective.

For the economic history of the Netherlands, a number of studies describe developments from 1800 onwards on the basis of the project *Reconstruction of the National Accounts.* These include the development of the economy in general, agricultural production and productivity, money and banking, and infrastructure.

Other contributions look at poor relief and charity work, alcohol use and abuse, education and how households have developed. The history of labour and wages in the Netherlands receives much attention, especially women in the labour force, income disparity and the trade union movement.

5. Other publications

In addition to these scientific studies three other products have been published on the occasion of the centenary.

A Bibliography with all CBS publications 1899–1998 (Dutch only)

This bibliography contains brief abstracts of all publications published by Statistics Netherlands in the last hundred years, covering a wide range of subjects: population, labour, trade and industry, income, education, traffic and transport, agriculture, health, culture, crime, etc. The bibliography is accessible via the Internet (www.cbs.nl).

The Dutch Population Censuses 1795–1971 on CD-ROM

Population censuses provide much and detailed historical information on the size and composition of the population by age, region, religion, occupation, housing, level of education etc. These large-scale enumerations have been held in the Netherlands since 1795, and from 1829 to 1971 were conducted every ten years. It is therefore not surprising that these publications are among the most widely consulted at Statistics Netherlands. However, because of their frequent use, the physical state of some of the volumes has deteriorated badly. Statistics Netherlands has taken the opportunity of its centenary to transfer all the population census data, some 40,000 pages, onto CD-ROM, in co-operation with the Netherlands Institute of Information Services (NIWI).
The first census held by Statistics Netherlands was in 1899. All the numerical data from this enumeration have been digitised and are directly accessible, so that users can compile their own tables. The CD-ROM is a rich source of historical information for researchers.

Tweehonderd jaar statistiek in tijdreeksen, 1800–1999
(Two hundred years of statistics in time series, 1800–1999)

In addition to an update of Statistics Netherlands' *95 jaar Statistiek in tijdreeksen* (95 years of statistics in time series) this publication also contains data from the 19th century. The project *Reconstruction of the National Accounts* linked twentieth century statistics to those from the 19th century. Again, the publication covers a wide range of social and economic subjects
The historical-statistical data constitute a source for quantitative insight into the processes of economic and social change, as well as the decisive factors of economic growth and decline.

- Anne-Marie Kuijlaars, *Het huis der getallen. De institutionele geschiedenis van het Centraal Bureau voor de Statistiek.* Diss. Erasmus University Rotterdam, Amsterdam 1999, Press Stichting Beheer IISG. ISBN 90.6861.166.6. (with an English summary).
- *A century of statistics. Counting, accounting and recounting in the Netherlands.* Eds. J.G.S.J. van Maarseveen and M.B.G. Gircour, Amsterdam 1999, Press Stichting. Beheer IISG. ISBN 90.6861.168.2.

- *A century rounded up*. Eds. J.G.S.J. van Maarseveen and M.B.G. Gircour, Amsterdam 1999, Press Stichting Beheer IISG. ISBN 90.6861.174.7.
- G.J.M. van Baarsel and W.A.F.M. Commandeur, *Honderd jaar cijfers in drieduizend publicaties*. A Bibliography of all CBS publications (on the Internet).
- *De Nederlandse Volkstellingen 1795–1971* (The Dutch Population Censuses) on CD-ROM. Eds. J.K. Jonker, J.G.S.J. van Maarseveen, T. Vreugdenhil and P.K. Doorn.
  Vol. 1. Data and publications of the Population Census 1899. 2 CD. ISBN 90.6861.176.3
  Vol. 2. Publications of the Population Censuses 1795–1971. 5 CD. ISBN 900.6861.177.1
- *Tweehonderd jaar statistiek in tijdreeksen 1800–1999*. (Two hundred years of statistics in time-series), Amsterdam 1999, Press Stichting Beheer IISG. ISBN 90.6861.175.5 + CD-ROM.
- *Nationaal goed* (Facts and figures about the Dutch society 1800–1999. Eds. R. van der Bie and P. Dehing. Amsterdam 1999, Press Stichting Beheer IISG. ISBN 90. 6861.169.0.

R.B.J.C. van Noort new Director-General of Statistics Netherlands

As from 15 September 1999, Ruud van Noort (56) has been appointed Director-General of Statistics Netherlands, succeeding Ad Abrahamse who has taken advantage of early retirement.
Mr. van Noort was already familiar with Statistics Netherlands; in his previous function of Director-General of the Netherlands Institute of Public Health and the Environment, he was involved in the close collaboration of the two institutions in the areas of environmental and health statistics.
Mr. Van Noort is devoting much of his time at present to the ongoing reorganisation of the Bureau, but will also remain active in the international statistical community.

W.F.M. de Vries Deputy Director of UN Statistical Division

Willem de Vries has left his post as Deputy Director-General of Statistics Netherlands and has been appointed Deputy Director of the United Nations Statistical Division in New York as from 1 November 1999. Mr. de Vries has been very active in the international statistical community for a great many years, and was awarded the Schumann medal for his services to the Statistical System of the European Community.

Death of W. Begeer

Just a few weeks before his seventieth birthday, Willem Begeer passed away completely unexpectedly on 1 September 1999.
During prof. dr. Begeer's 14 years as Director-General at Statistics Netherlands, from 1977 to 1991, the Bureau underwent many important developments, in particular a revolution in information technology. Thanks to his insights, Statistics Netherlands was one of the first national statistical offices – and in fact also one of the first Dutch government agencies – to switch over from mainframe to personal computers, and indeed laptops for data collection from households. From 1982 onwards, Statistics Netherlands underwent a continuous series of budget cuts, which disappointed Mr. Begeer deeply, but which he never accepted without a fight.
Internationally he was active as chairman of the Conference of European Statisticians (1987–1988) and the United Nations Statistical Commission (1991). The necessity of international statistical co-operation was one his strong beliefs and he made a major contribution to it by co-writing (with Tom Griffin) a report for the UN about improvements in the functioning of the international statistical system, which is still known as the *Begeer report*.
Having chaired the organisation committee of the 1985 Centennial ISI Session in Amsterdam, he continued to do some work for the International Statistical Institute after his retirement. In particular, he was instrumental in setting up so-called 'briefing seminars' for newly appointed senior managers of national statistical institutes.