Review of Statistics Denmark

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Executive summary

The statistical system of Denmark is a well functioning, centralised system with Statistics Denmark as the responsible authority. Statistics Denmark is characterised by independence and professionalism, and is able to guard important values of official statistics like objectivity, impartiality, and quality of statistical outputs, and to protect the confidentiality of observation data from respondents.

Statistics Denmark: organisation and resources

Statistics Denmark has an internal organisation of a type that is common for national statistical offices, with one functional division and three subject matter divisions, reflecting the traditional stove-pipe organisation of statistics production, with a number of input-thruput-output production lines running in parallel.

Statistics Denmark has a dedicated professional staff. However, in comparison with other statistical offices, Statistics Denmark has a smaller percentage of methodologists. The staff with university education are mainly limited to economists. This could turn out to be hampering for a continued positive development of efficient production processes and high-quality products and services.

Statistics Denmark has an adequate IS/IT infrastructure. Extensive use of standardised procedures and software processes is a strong point. Another strength is the creative use of Internet-based techniques for making the statistical outputs easily available to users. These achievements are partly due to constructive co-operation with other statistical agencies, and there is still room for considerable further improvements in these areas by means of intensified international co-operation. There is also room for continued simplification and rationalisation of the IT platforms used by Statistics Denmark. For example, the on-going outphasing of the mainframe should be speeded up, if possible.

An interesting and positive feature of the technical infrastructure of Statistics Denmark is that printing processes and tools are well integrated with the computerised processes, which is not common in most other statistical offices.

Statistics Denmark has inexpensive office space at its disposal and the room standard is good.

General budgeting and control processes could be improved in order to create better feed-back mechanisms between users, producers, and “owners”. A better accounting system could provide more useful information about the real costs of different products and activities. However, these are changes that Statistics Denmark cannot carry out on its own; they are by and large the responsibility of the government.

Statistics production

Data collection and data preparation (entering, coding, checking, and correcting observations) are the most resource-consuming operations in statistics production. Statistics Denmark has

done a lot to keep these costs down by using standardised software providing efficient computer-support to the processes, by introducing checking methods based on statistical methodology (so-called macro-editing), and by offering respondents to report electronically via a common web-site for the government (*digital forvaltning*).

Statistics Denmark has skilfully exploited its possibilities to use administrative data for statistical purposes. Advanced statistical methods can be used in order to reap more benefits from this advantage, e.g. by means of combining register data with data from sample surveys in even more elaborated ways than at present. On the European level it is important for Denmark to defend and promote this rational strategy for producing official statistics of good quality and with much less work on the part of the respondents than would be required if only traditional statistical surveys could be used. Statistics Denmark should be at the forefront in efforts to solve methodological problems associated with register-based statistics production.

Statistics Denmark provides good services to its users in a very efficient way by using Internet-based instruments such as *Statistikbanken* and *Forskerservice*. However, documentation and metadata have to be further developed and properly used in the dissemination and presentation systems, so that users will not misinterpret the statistical data, and so that they can judge for themselves whether certain data can be used for a certain purpose or not, and whether different statistical data are comparable with each other.

Another possibility to increase the efficiency of statistics production is to organise the collected observation data – data from administrative sources as well as data collected directly for statistical purposes – in such a way that they can easily be combined and reused. In order to facilitate this, one may organise statistics production around a so-called clearing-house function, or data warehouse. Incoming data from different sources are checked for possible inconsistencies and then stored and described in a standardised way. After that they can be combined and processed in a flexible way and contribute to a wide range of statistical outputs. Statistics Denmark has started to exploit these possibilities in connection with *Statistikbanken*, *Forskerservice*, and *Det personstatistiske registersystem*.

Quality

Statistics Denmark has adopted a multi-dimensional quality concept which is very similar to the quality concepts applied by other European statistical agencies. Statistics Denmark has defined five quality dimensions: relevance, reliability, timeliness, coherence, and accessibility. On the whole, Statistics Denmark compares well with other national statistical offices as regards all these aspects of quality. With regard to timeliness and accessibility Statistics Denmark seems to belong to the best.

Good documentation of data and processes is a prerequisite for all aspects of quality, since the quality must at least be known and described, before we can judge it. Good documentation, in combination with feed-back performance data from production processes, can also be used for systematically improving the quality and efficiency of processes. Statistics Denmark – like many other statistical offices – has still a lot to do in order to establish and maintain adequate documentations of processes and data. The quality declarations, which are available on the Internet for all statistical products, are a good start. The basic documentations of observation data are underway within the TIMES system that has just appeared on the Internet, but these

documentations are still incomplete and defective. Standardised documentations of processes and production systems are lacking entirely.

The efficiency of Statistics Denmark

Is Statistics Denmark an efficient producer of official statistics? In order to give an answer to this question, we have compared Statistics Denmark with other statistical agencies with regard to resources used and outputs produced.[1] By limiting the comparisons to countries of about the same population size and with similar administrative infrastructures, it is relative easy to see that Denmark spends less resources than comparable countries on production of official statistics.

The next question then is whether Denmark produces as much official statistics as others, and if the official statistics that it produces are of at least the same quality as the statistics produced by other countries.

Available information shows that Denmark produces more or less the same statistics as comparable countries, partly because of EU membership and other international obligations.

As regards the quality of the outputs, we have found that Statistics Denmark produces official statistics which are at least as good as the official statistics produced by comparable statistical offices. This holds for all five quality dimensions that we have studied. Process documentations and data descriptions (metadata) are not yet of satisfactory quality, but Statistics Denmark is not worse in this respect than most other producers of official statistics.

In summary, Denmark produces more or less the same official statistics, with roughly the same quality, as comparable countries, but Denmark uses considerably less resources for doing this. Thus, in international comparison, Statistics Denmark is certainly an efficient producer of official statistics of good quality, at least for the time being. The difference between Statistics Denmark and other producers of official statistics is actually so striking that one must ask what causes it. Could it be that all the other countries are remarkably inefficient in producing official statistics? We do not think so. Instead we think that an important part of the explanation is that Statistics Denmark has over a number of years rationalised its activities to the extent that the methodological capital cannot be properly maintained any longer. At the same time safety margins in production processes have shrunk, and the risks for errors and other deficiencies are increasing. This is not just speculation – there is some hard evidence. The number of methodologists is very small in international comparison, and it has decreased in recent years. The percentage of staff with an academic education is smaller than in comparable statistical offices in other countries. There are growing difficulties for Statistics Denmark to find time and resources for urgent quality evaluations and development projects, as well as for active participation in joint efforts on the international level.

A question that we have got, and that is worth analysing, is whether it would not be possible to organise production of official statistics in some completely different way in order to drasti-

[1] Adjustments have been made in order to make figures comparable despite the fact that some countries, like Denmark, have a very centralised system for production of official statistics, whereas other countries have more decentralised systems with different agencies being responsible for different parts of the official statistics.

cally increase the efficiency. A realistic change that we have already mentioned, is the transformation from an organisation based on parallel production chains, so-called stove-pipes, to production systems organised around a common clearing-house. This change will have significant consequences, technical and methodological, as well as organisational and economical.

Many countries are practising decentralised alternatives to the centralised organisation model used in Denmark and many other countries. Decentralised solutions may have certain advantages, especially for statistics where a dominating user is also the natural alternative producer of the statistics concerned. However, it is a widely accepted view that centralised production of official statistics is usually more efficient from a production point of view and more convenient for users and respondents. Especially in small countries, like Denmark, it is difficult to establish a critical mass of necessary methodological competence in more than one place.[2] If the responsibility for different parts of the official statistics of a country is split between several organisations, it becomes more difficult to create one coherent statistical system for the country, and to combine statistical data from different sources with each other. Security and confidentiality problems will also occur, as soon as data owned by different organisations need to be combined.

An issue that has certain similarities with the centralisation/decentralisation issue is whether it would be possible to let different actors on a market compete for contracts to take care of different parts of statistical systems or even whole systems/products. Limited outsourcing of well-defined auxiliary functions is already being practised by many statistical offices, including Statistics Denmark. Functions that may be suitable for outsourcing include IT operations, printing, interviewing, and different administrative functions. These kinds of functions are neither strategic nor core functions. If one tries to outsource core functions and whole systems/products, one will encounter similar problems as in connection with decentralisation, as we have just discussed. Moreover, practical experiments of this kind that have been carried out, e.g. in Sweden[3], indicate that at least in a small country there may not be sufficient interest among potential market actors in order for a market to arise; the potential market for production of official statistics is simply too small and requires too big investments in tools and know-how.

The bottom line is that Statistics Denmark has notably less financing from the government than statistical offices in comparable countries. At the same time, Statistics Denmark produces official statistics with scope, contents, and quality fully comparable with the official statistics produced by other countries, for example the other Nordic countries. The scarce financial and methodological resources of Statistics Denmark imply, if proper steps are not taken, growing risks of deteriorating process quality, errors in statistical end-results, obsolete productions methods, and inefficient production systems. Alternatively, explicit decisions will have to be taken to lower ambition levels in such a way that less official statistics are produced and/or produced with lower quality. We are convinced that the single most important thing to do in order to prevent this development from happening, is for Statistics Denmark to increase its capacity in methodological areas of importance for statistics production, thus enabling

[2] Actually the present situation at Statistics Denmark illustrates that it may be difficult to establish and maintain such a critical mass even if it is concentrated to one centralised organisation.
[3] See section 4.3 of this report.

- a strengthening of the systematic quality and rationalisation work at Statistics Denmark
- continued active participation in international co-operation with other statistical agencies
- intensified co-operation with universities and research institutes
- efficient exploitation of forthcoming technological and methodological progress
- implementation of more efficient architectures and organisation models for the production of official statistics

Unfortunately this methodological strengthening of Statistics Denmark will require some more resources rather than budget cuts. However, the relatively marginal increase in methodological resources that we find necessary at this moment in the life of Statistics Denmark could, and should according to our opinion, be seen as an investment needed to secure a sustainable productivity gain of 2-3% per year that is reasonable to demand from a statistical office.

1 Introduction

1.1 Terms of reference

As part of a budget analysis of Statistics Denmark carried out by *Økonomi- og Erhvervsministeriet* and *Finansdepartementet*, we were appointed to undertake "- en uvildig undersøgelse af Danmarks Statistiks produktion og arbejdsgange i komparativ sammenhæng".

In Terms of reference [Danmarks Statistik 2003c] spelling out the details of our task, it is specified that the investigation should focus on:

"

- *Brug af metoder til de enkelte led i hele produktionsprocessen, herunder standardisering*
- *Organisering af arbejdet*
- *Tilstedeværelse af nødvendig kompetence*
- *Understøttelse af produktionsprocessen med it*

Undersøgelsen skal analysere disse ting med hensyn til:

- *Effektivitet*
- *Kvalitet af resultatet*

På baggrund af denne undersøgelse skal undersøgerne fremsætte en samlet vurdering og anbefalinger til optimering.

"

The report should be completed and submitted by the 2nd of May 2003.

1.2 Reviewers' work

We, the reviewers, started our commission by a two day visit to Statistics Denmark 6 - 7 March 2003 to collect information and interview staff members about the different aspects to be covered by the investigation. A second two day visit was done 24 - 25 April 2003 to get the last pieces of information required for the report. Between these meetings, we have had extensive contacts by means of e-mail.

We would like to express our appreciation of the positive and constructive spirit in which we have been received by representatives of Statistics Denmark. All our questions – and they have been many – have been responded to, patiently and without delay.

2 The statistical system in Denmark

Like most other countries, Denmark produces official (or public, *offentlig*) statistics[4] on a regular basis. Official statistics are multi-purpose statistics, the production of which is financed via the state budget. Official statistics are regarded as public goods, and they are intended for both instrumental and informative needs. Official statistics are used for instrumental purposes by decision-makers in all sectors of society, both public and private, e.g. by central, regional, and local governments and agencies, by private companies, and by non-government organisations. Official statistics are used for informative purposes by researchers, analysts, journalists, students, and the public at large.

Official statistics should be objective and impartial, they should adhere to international standards, be well documented and of good quality, and be produced according to best methods and practices, as defined by professionals in the field. These principles are well established in national and international legislations and in professional codes.[5]

2.1 The legal basis and the role of Statistics Denmark

Statistics Denmark is responsible for production of official statistics in Denmark. The legal basis for Statistics Denmark is *Lov om Danmarks Statistik* [Danmarks Statistik 2003 b] stating that Statistics Denmark is the central authority for the Danish statistics, responsible for collection, processing, and publishing of statistical information concerning society. Statistics Denmark has the right to access and use administrative data from other public agencies and institutions for statistical purposes

The law states that Statistics Denmark is an independent institution, lead by a board, *Styrelsen*, chaired by *Rigsstatistikeren* and reporting to *Økonomiministeren*. The law does not require that the members of *Styrelsen* should be proposed by, or represent, the interests of specified user groups; the interests should be taken care of by user groups established by *Styrelsen*.

Legislation that ensures the confidentiality of statistical data can be found in *Forvaltningsloven*, *Offentlighedsloven*, and *Lov om behandling af personoplysninger*.

Paragraphs 10 and 45 in *Lov om behandling af personoplysninger* are particularly important.

§ 10 states:

"Oplysninger som nævnt i § 7, stk. 1, eller § 8 må behandles, hvis dette alene sker med henblik på at udføre statistiske eller videnskabelige undersøgelser af væsentlig samfundsmæssig betydning, og hvis behandlingen er nødvendig for udførelsen af undersøgelserne.

[4] Strictly speaking, the term "official statistics" is not used officially in Denmark, but the concept clearly exists, and we shall use the term in this report, with the definition given in this paragraph.
[5] See e.g. the UN Fundamental Principles of Official Statistics, http://unstats.un.org/unsd/goodprac/bpabout.asp

Stk. 2. De af stk. 1 omfattede oplysninger må ikke senere behandles i andet end statistisk eller videnskabeligt øjemed. Det samme gælder behandling af andre oplysninger, som alene foretages i statistisk eller videnskabeligt øjemed, jf. § 6.

Stk. 3. De af stk. 1 og 2 omfattede oplysninger må kun videregives til tredjemand efter forudgående tilladelse fra tilsynsmyndigheden. Tilsynsmyndigheden kan stille nærmere vilkår for videregivelsen."

§ 45 states:

"Forinden behandling, som er omfattet af anmeldelsespligten i § 43, iværksættes, skal Datatilsynets udtalelse indhentes, når

1) behandlingen omfatter oplysninger, der er omfattet af § 7, stk. 1, og § 8, stk. 1,
2) behandlingen udelukkende finder sted med henblik på at føre retsinformationssystemer,
3) behandlingen udelukkende finder sted i videnskabeligt eller statistisk øjemed, eller
4) behandlingen omfatter sammenstilling eller samkøring af oplysninger i kontroløjemed."

§ 30 in *Forvaltningsloven* states:

"Fortrolige oplysninger, der udelukkende er indhentet med henblik på statistiske uddrag eller som led i en videnskabelig undersøgelse, må ikke videregives til en forvaltningsmyndighed til anden anvendelse."

§ 10 in *Offentlighedsloven* states among other things:

"... Retten til aktindsigt omfatter ikke: ... Materiale, der tilvejebringes som grundlag for udarbejdelse af offentlig statistik eller videnskabelige undersøgelser."

Unlike some other countries, Denmark does not have any explicit law (like the Swedish *Statistiklagen*, for example) that formalises requirements on objectivity, quality, etc, of official statistics, but such requirements can be found in policy documents from Statistics Denmark, approved by *Styrelsen*. For example, *Strategi 2006* [Danmarks Statistik, 2001b] contains the following statements:

> "Det er helt afgørende for Danmarks Statistik,at institutionen er troværdig. Kun hvis troværdigheden er høj, har brugerne gavn af Danmarks Statistik.
>
> Danmarks Statistik skal tjene de almene samfundsmæssige interesser og skal derfor være uafhængig af politiske og økonomiske særinteresser. Institutionen skal på videnskabeligt grundlag levere alsidig og upartisk statistik. Statistik, der produceres af myndigheder eller organisationer med stærke politiske eller økonomiske interesser, kan derimod, uanset kvaliteten, risikere at blive mistænkeliggjort.
>
> At institutionen arbejder på et videnskabeligt grundlag indebærer, at professionalisme og faglige hensyn er afgørende ved valg af metoder for dataindsamling, bearbejdning, opbevaring og formidling af statistiske data. Det indebærer også, at hele denne proces er veldokumenteret.
>
> Der er flere andre forhold, som afgør troværdigheden. Nogle af de vigtigste forud-sætninger for at sikre troværdigheden, er:
>
> - at statistikkerne er pålidelige. Tal,analyser og kommentarer skal være til at stole på. Kvaliteten skal altid være så god, at der ikke kan være tvivl om, at statistikkens billede af samfundet er retvisende.

- at statistikken offentliggøres uden forsinkelse, når den er færdig og kvalitetskontrolleret. Udgivels stidspunktet forudannonceres. Endelig bliver alle brugere bekendt med statistikkens resultater på samme tidspunkt.

- at oplysninger om enkeltpersoner og virksomheder behandles fortroligt. Endnu ikke offentliggjorte tal er ligeledes fortrolige."

Despite the absence of a statistical law, we think that policy statements like these, in combination with the earlier mentioned laws that ensure the independence of Statistics Denmark and protect statistical confidentiality, imply that statistics production in Denmark is as objective and impartial as in comparable countries, and clearly lives up to the ideals stated by international organs and professional codes.

Production of official statistics is highly centralised in Denmark, both from a sectorial and from a regional point of view. Only minor parts are produced by other agencies than Statistics Denmark. Thus, what could be called "The Danish Statistical System" is more or less identical with the statistical system for which Statistics Denmark is responsible. Statistics Denmark is also physically located in one place[6], in Copenhagen, the capital of Denmark.

According to international experiences it is favourable both for the professionalism and for the efficiency, if there is one central agency, located in one place, which is responsible for all, or almost all, production of official statistics.

The three main tasks and responsibilities of Statistics Denmark are stated as follows in *Strategi 2006* [Danmarks Statistik 2001b]:

- Den første og væsentligste opgave er *at indsamle, bearbejde og offentliggøre statistiske oplysninger* om samfundsforholdene. I tilknytning hertil udarbejdes statistiske analyser og prognoser. Opgaverne kan løses i samarbejde med andre statistikproducenter.

- Den anden opgave er at bidrage til *det internationale statistiske samarbejde* for at fremme statistikkens nytteværdi, bl.a.ved at gøre den internationalt sammenlignelig. Herunder indgår Danmark som medlem af EU i et lovmæssigt forpligtende samarbejde om indsamling og bearbejdning af statistik.

- Den tredje opgave er at udføre statistiske opgaver for private og offentlige kunder mod betaling, de såkaldte *serviceydelser*."

2.2 International co-operation

Statistics Denmark is also responsible for international co-operation in the field of official statistics. From an institutional point of view, the most important international relationship is with *Eurostat*, the central statistical office of the *European Union*. The European Union has issued more than 150 statistical regulations, which determine in great detail a majority of the activities in Statistics Denmark. The activities implied by the EU requirements counted in 2002 for more than 50% of all man-years financed by the regular budget.

[6] With the exception of a few people working in a subsidiary in Århus.

In addition to the EU, Statistics Denmark reports statistical data to the *United Nations*, the *European Council*, the *International Monetary Fund (IMF)*, the *Organisation for European Co-operation and Development (OECD),* and other specialised international organisations according to approved international agreements. Statistics Denmark is a subscriber to the IMF-prescribed Special Data Dissemination Standard (SDDS), which means that Statistics Denmark has committed itself to deliver certain statistical data and metadata to IMF in accordance with this standard.

Statistics Denmark also participates in the professional exchange between national statistical offices. Part of this co-operation is within the frameworks of the international organisations just mentioned, whereas other parts are more informal and take place on a bilateral or multilateral basis.

International co-operation between statistical offices often triggers benchmarking activities (systematic comparisons), and development of so-called "current best methods" and "current best practices", which in turn stimulates standardisation and improvements in quality and efficiency in individual statistical offices as well as in the international statistical system as a whole.

Statistics Denmark participates in international cooperation in several ways. Most extensive is work within EU and other international organisations to which Denmark is committed by membership. These commitments are labour-consuming and expensive, but because of standardisation and increased dissemination, also useful for statistics in general.

Another area of co-operation is participation in research projects. Statistics Denmark has not engaged in international research projects to the same degree as the other Nordic statistical institutes because of resource restrictions.

2.3 Control mechanisms in the Danish Statistical System

As has already been noted, Statistics Denmark has a very independent role. Within the overall budget restrictions, set by the government, and the regulations given by the EU, Statistics Denmark and its Board, chaired by *Rigsstatistikeren*, have rather free hands to prioritise both the contents of official statistics and the organisation and production methods used.

There are some possible drawbacks of this independence. The dominating role of Statistics Denmark may lead to some difficulties for different categories of users to gain attention for their needs and demands. Statistics Denmark has established a number of advisory groups and councils, where users can express their views, but this is a rather weak form of user influence.

This independence and freedom is not always, however, to the advantage of Statistics Denmark. In the absence of "direct tubes" between entries in the government budget and statistical products produced by Statistics Denmark, it is relatively convenient for the government to make percentage cuts in the budget for Statistics Denmark; then it is up to Statistics Denmark to determine how it should accommodate itself to the cuts.

3 Statistics Denmark: organisation and resources

We will discuss the organisation and control mechanisms as well as resources used by Statistics Denmark for producing official statistics.

3.1 Organisation and control mechanisms

As shown by *Figure 1*, the organisation of Statistics Denmark consists of three subject matter divisions, a service division, a centre for administration, and an international secretariat.

Styrelsen is the responsible policy making body. *Rigsstatistikeren,* who is appointed by the King, has the executive professional and administrative responsibility for the statistical work of Statistics Denmark.

Finally the organisation has a number of advisory councils at its disposal. A special role is played by *Bestyrelsen for Økonomisk Model ADAM*, which we shall not go into here.

3.1.1 Planning and accounting procedures

The planning procedures in Statistics Denmark comprise a set of activities with the strategic planning [Danmarks Statistik 2001b] on top. Long range plans specified by annual work plans [Danmarks Statistik 2003b, Danmarks Statistik 2003e] and specialised strategic documents such as the register strategy [Danmarks Statistik 2001b] and the IT-strategy [Danmarks Statistik 2002a] are prepared.

The plans are confirmed by agreements, *Kontrakter*, on different levels from the agreement with *Økonomi- og Erhvervsministeriet* [Danmarks Statistik 2003a] to internal agreements between the top management and the departments (*afdeling*) of Statistics Denmark, and between the departments and their divisions (*kontor*) [Danmarks Statistik 2003d].

Activities and the results obtained in the passed year are systematically reported in activity accounts [Danmarks Statistik 2003a].

3.1.2 Budgetary procedures

Budgets are prepared within Statistics Denmark based on their strategic and annual work plans. In practice, *Styrelsen* is given a total by the Ministry of *Økonomi- og Erhvervsirksomhet*.

After approval in the parliament, the budget is granted as a lump sum. About 70% of the budget is used for salaries. For 2003, the budget of Statistics Denmark expressed by man-years is about 550, of which ¾ are financed by public grants. The remainder is income from paid statistical services.

3.1.3 Strategic issues

The strategic plans are updated for 5 years ahead by Statistics Denmark with the objective to express how the organisation intends to deliver the best possible statistics about the socio-economic conditions in Denmark. The plan is based on input from the different parts of Statistics Denmark and from the advisory committees and presented for and approved by *Styrelsen*.

The present strategic plan covers the period up to 2006.

3.1.4 An observation concerning the budgeting and accounting system

The internal budgeting and accounting system of Statistics Denmark does not allow or enforce the distribution of all costs (direct and indirect; staff, capital, and expenses) to the final, external products (typically statistical products). This makes it difficult to compare costs for different products and services of Statistics Denmark with similar products and services provided outside the office. Since overhead costs are not distributed, individual products and services may look cheaper than they actually are. It also becomes difficult to make objective comparisons between different organisational solutions. For example, the costs for different products will seem to be completely different if one compares a functional organisation (with a lot of indirect costs) with a more line-oriented organisation, where every product line has to provide most of their own services; still the total costs for all activities may be the same for the two different organisational solutions.

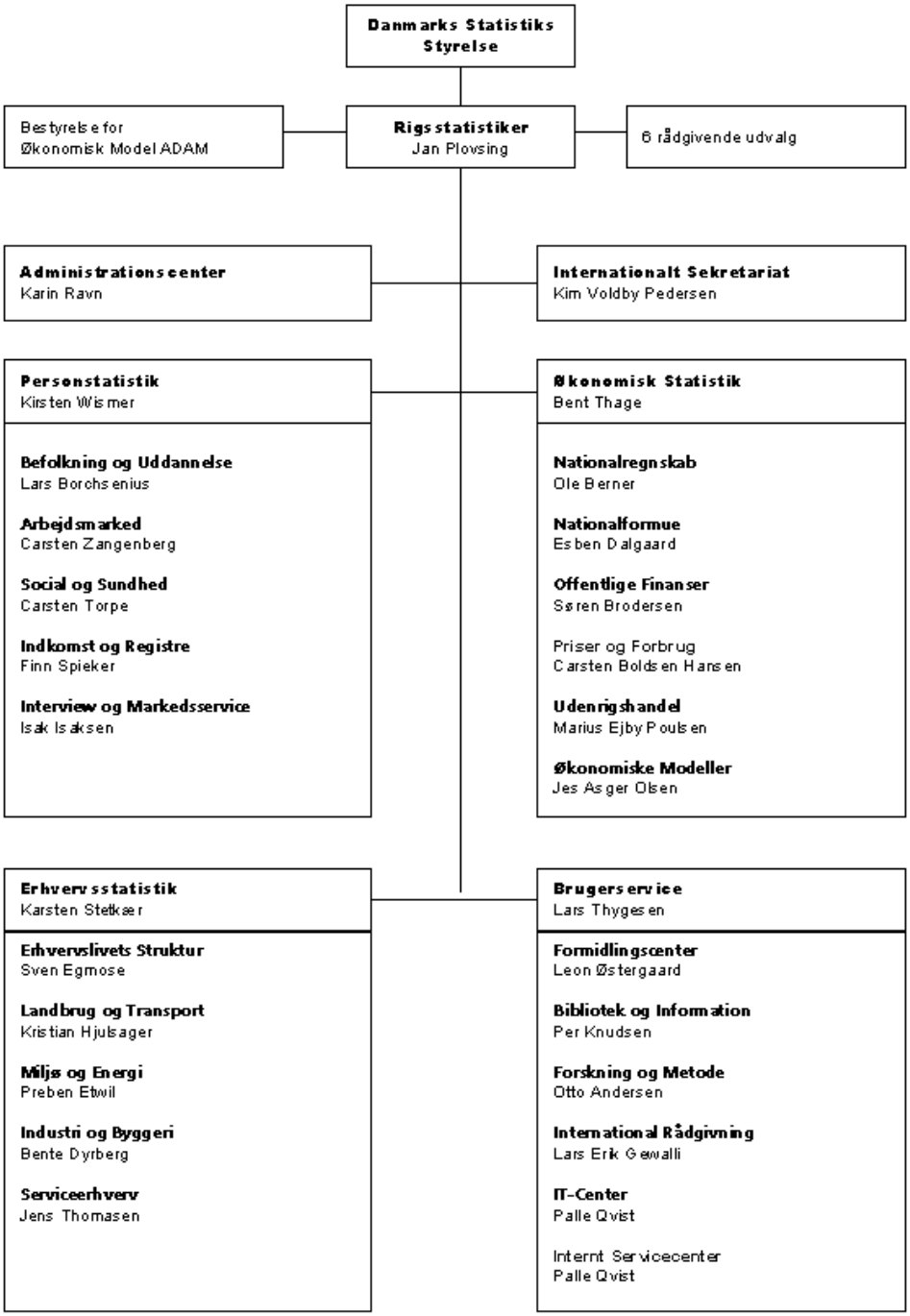


Figure 1. Organisation scheme for Statistics Denmark.

3.2 Enabling resources

We will discuss three kinds of resources that enable statistics production at Statistics Denmark:

- human resources
- office space
- IS/IT resources

3.2.1 Human resources

Categories and size

The staff of Statistics Denmark is composed of the following categories:

- Managers
- Academic staff
- IT staff
- Clerical staff

The staff worked in total 564 man-years in 2002 [Danmarks Statistik 2003e] which were distributed on categories with 7% to leaders, 30% to academic staff, 15% to IT-personnel and 48% to clerical staff.

The total input of man-years are planned to be reduced by 16 man-years in 2003. During the current strategy period, from 2001 to 2006, the man-power budget is expected to be reduced by 84 man-years corresponding to 14%. Additional reduction is expected from 2006 to 2007.

Education, training, and competence

A higher fraction of the work in Statistics Denmark seems to be done by clerical staff than in comparable statistical offices. The major part of the academic staff is trained as economists, since the universities are considered to offer few possibilities for more relevant education and training in official statistics.

Most of the IT-staff has no academic training. One explanation is again that no university training is directly suited for work in a statistical organisation. The dominance of non-academically trained IT staff seems to be unfortunate for the long term development of Statistics Denmark. It should be emphasised that the present IT staff is doing an excellent job, but we suspect that a more productive relationship for developing new visions and implementations could be obtained by recruiting more IT personnel with university education in computer and information sciences.

Since the recruited personnel rarely has adequate training in topics of vital importance for statistics production, an extensive internal training activity is required. Statistics Denmark has developed courses and on-the-job training for all categories of personnel in a very impressive set of short courses [Danmarks Statistik 2002c]. The training catalogue for Autumn 2002 - Spring 2003 includes about 25 general courses in relevant topics, 20 courses in specific statistical methods, and 30 courses in IT-topics. Even though these courses seem to give very good results, we raise the question if it would not be more effective to recruit more educated staff, if possible.

Based on what we have seen of productions systems and results delivered by Statistics Denmark, the competence seems to be high in general. Because of the recruitment situation, the number of competent methodologists with university background in statistics is however low, which was manifested to us by the fact that nearly all divisions referred to one and the same person, the chief methodologist, as the key person for most methodological solutions.

In conclusion, Statistics Denmark has based its recruitment on university trained economists and non-academic personnel. National economy seems to be the most adequate academic training for official statistics offered by universities in Denmark. We think that recruitment also from other social science disciplines would be beneficial. In particular we recommend that the statistical methodology is further strengthened.

Co-operation with universities

The following passage quoted from information provided on our request, indicates the relationship of Statistics Denmark to the universities:

"Vi har ikke noget stærkt formelt samarbejde med universiteter og højere læreanstalter. Det er klart, at vi taler med vores venner på disse steder og bruger deres råd. Det forekommer sjældent, at vi bruger dem som egentlige konsulter, men det er dog sket, typisk i forbindelse med forskningsprægede opgaver, som udføres af Danmarks Statistik. Jeg kan som noget specielt nævne, at vi i en lang årrække har brugt den kendte demografiprofessor P. C. Matthiessen som konsulent for befolkningsstatistikken, han har et kontor her.

Ud over det er vores brug meget ad hoc. Vi har i meget begrænset omfang (3 tilfælde) fungeret som vejleder for doktorander (PhD), som så har udført en del af deres studier hos os. Vi som institution giver normalt ikke forelæsninger på universiteter (Undtagelse: Undervisning af journaliststuderende på Roskilde Univeristetscenter, Syddanskuniversitet og Journalisthøjskolen i statistik og datafinding sker som en del af nogle medarbejderes almindelige arbejde i DSt), men nogle af vores ansatte giver som enkeltpersoner sådanne forelæsninger - de repræsenterer altså ikke DSt. Som du ved, har vi et rådgivende forskningsudvalg, hvor der sidder professorer o.l., og nogle af dem benytter vi også ad hoc til andre ting, fx i relation til EU. Som du også ved, har vi kontakt med mange forskere, som bruger Danmarks Statistiks data gennem forskerordningerne."

Even though university students frequently are engaged as part-time workers In Statistics Denmark, we believe that a closer and more active relation between Statistics Denmark and university departments of statistics, social sciences, and IT, would be beneficial to the official statistics of Denmark. More co-operation between Statistics Denmark and universities would be useful for both parties even in a short run. University students and researchers would find interesting topics for their examination works and theses, and Statistics Denmark would get assistance in its search for better methods and procedures in statistics production. Common courses could be arranged with both teachers and participants from both Statistics Denmark

and university institutions. In the longer run, an active, bi-directional co-operation would hopefully lead to education programs at the universities of greater relevance for work in official statistics.

3.2.2 Office space

The office space of Statistics Denmark occupies 29,818 m^2, including meeting rooms, corridors, archives, and Statistics Denmark's part of common space shared by all tenants in the building. Divided by 575 employees, this means 52 m^2 per person. The total yearly cost for renting this space is 19,532,914 DKK, which means 655 DKK per m^2.

In international comparison the rent seems to be very low, whereas the amount of office space per employee seems to be relatively high.

3.2.3 IS/IT resources

Technical platforms

The information systems at Statistics Denmark are based upon three technical platforms:

- mainframe
- UNIX
- MS Windows

In an international comparison, some statistical offices, e.g. Statistics Netherlands and Statistics Sweden, have been able to reduce the number of platforms to one, which simplifies the IS/IT infrastructure and makes it less expensive to maintain.

Statistics Denmark has started outphasing of the mainframe. Most applications will then run on a PC/LAN architecture with MS Windows as the operating system. However, UNIX servers will be retained, since they are regarded as necessary for running ORACLE databases.[7]

Software tools

Statistics Denmark has selected a small number software products as strategic products and standards, and most application systems are based upon these products standards:

- MS Office
- SAS
- ORACLE
- BLAISE
- PC-AXIS

[7] Statistical offices who have been able to limit themselves to a single technical platform have typically chosen some other database management system, e.g. MS SQL Server.

- SuperStar

Costs

Central IT staff

Type of work	Person years	Cost (DKK)
Management and administration	9.0	4,211,000
Operation of the technical infrastructure	6.3	2,520,000
Development work (e.g. methods and software tools)	7.7	3,080,000
Own training	1.8	720,000
Training of others, incl handbooks	3.1	1,240,000
Support for standard software tools	3.0	1,200,000
Other support (helpdesk, helprunner etc)	3.0	1,200,000
Printing and distribution of printed products	7.0	2,450,000
Paid services[8] (e.g. *Lovmodel*)	2.6	1,040,000
Total	**43.5**	**17,661,000**

External costs

Type of cost	Consultants (MDKK)	Other costs (MDKK)
Hardware (incl. operation of mainframe)	2.2	12.6
Operating systems (UNIX and Windows 2000 Server)	0.3	0.5
Standard software packages	0.5	5.4
Application development consultancies	2.1	0.0
Service to researchers (*forskerservice*)	0.3	1.5
Printing	2.7	1.9
Other external costs (consumption, telephones, travels etc)	0.6	2.4
Total	**8.7**	**24.3**

Costs for non-central IS/IT

Statistics Denmark estimates that 51 persons are working as IT staff in other parts of the organisation than the central IT unit, corresponding to an estimated cost of 20.4 MDKK.

Analysis

The total estimated cost for IS/IT at Statistics Denmark is in the order of 70 MDKK. Salary costs and external costs are included but not IS/IT's share of overhead costs. IS/IT costs should certainly be a major item in the budget of Statistics Denmark, since IS/IT is of decisive importance for the efficiency of the operations of Statistics Denmark as well as for the

[8] Commissioned work paid by other sources than the ordinary state budget for Statistics Denmark.

possibilities for Statistics Denmark to offer competitive products and services in the future. IS/IT is the major factor behind productivity gains in all statistical offices.[9]

Still there may be possibilities to increase the efficiency of IS/IT activities. For example, we think that the on-going outphasing of the mainframe should be speeded up as much as possible. Running several platforms in parallel is quite costly and takes management attention away from strategic issues of "the business" (*virksomheden*) of Statistics Denmark. Experiences from other statistical offices, e.g. Statistics Netherlands and Statistics Sweden, show that a big change project like the outphasing of a technical platform requires systematic and persistent efforts from top management in order to maintain momentum and stick to deadlines in the organisation.

It should also be further investigated whether Statistics Denmark could not at some stage leave the UNIX platform entirely and focus on one single technical platform. Two platforms is actually one too many for a small organisation like Statistics Denmark.

A very positive feature of IS/IT in Statistics Denmark is the consequent use of standardised software products, both products that are available on the commercial software market and products that have been acquired from other statistical offices. This policy and practice should be continued and maybe even further developed, preferably in close co-operation with other statistical offices.

An interesting feature of the organisation is that printing services have been included in the responsibilities of the central IT unit. This is rather uncommon but seems to be a good idea. Many statistical offices struggle with incompatibilities between statistical and printing operations. The incompatibilities are largely due to technical and cultural differences between different professional communities. By integrating IS/IT and printing Statistics Denmark has succeeded to overcome these differences and minimise the risks for incompatibilities. Instead the printing and distribution processes have become well integrated with the statistical production process as a whole. For example, electronic outputs on the Internet and printed outputs are accomplished by slight variations of the same production chain.

[9] In fact, since there are other factors that are negative for the productivity development, IS/IT may very well account for more than 100% of the finally resulting productivity gain in statistical offices, which is often estimated to be in the order of 2-3% per year.

4 Statistics production at Statistics Denmark

We will discuss inputs, outputs, and the processes and systems that transform inputs into outputs.

4.1 Input data sources

Statistical data are acquired either directly by contacts with respondents, or indirectly by using data collected by other government organisations for administrative and other purposes. Statistics Denmark can request administrative data from any other government organisation according to *Lov om Danmarks Statistik*. During the last 30 years, Statistics Denmark has increasingly used administrative sources for its data collection and has firm plans for continuing this development [Danmarks Statistik 2001a].

4.1.1 Administrative sources

By taking advantage of the Danish personal identification number, Statistics Denmark produced the first Population Census based on administrative data in 1976. The Central Population Register and other registers have made it possible to produce an increasing number of statistics from administrative sources saving the public, enterprises and others the time to report on statistical questionnaires. The statistics seem to be both timelier and without loss of accuracy compared with previous production.

A long range strategy for utilising administrative data for individuals has been developed to standardise the systems used for processing and keeping the data [Danmarks Statistik 2001a].

There are several advantages from using administrative data sources:

- data collection costs are only a fraction of what they would be if the same data had to be obtained by means of direct observations
- respondents do not have to be bothered with extra work, when data that they have already reported for administrative purposes can be reused for statistical purposes as well
- statistics can often be produced faster when existing data can be used, since less time will then be needed for data collection and data preparation
- more statistics can be provided
- total population coverage, important especially for studying small populations and for longitudinal studies

There are also some problems with using administrative data for statistical purposes:

- the influence of the statistical producer on definitions used by administrative processes is often rather limited, and these definition may not be ideal from a statistical point of view

- administrative data may be biased in certain ways that they might not have been if they had been collected directly for statistical purposes[10]

On the whole the advantages of using administrative data for statistical purposes in most cases quite clearly outweigh the disadvantages. Moreover, the disadvantages may be reduced or even eliminated if the statistics producer takes adequate actions, e.g. by using more advanced designs based upon advanced statistical methodology (e.g. model-based estimation methods), and by using intelligent combinations of administrative registers and sample surveys (e.g. designs based upon so-called supplementary information). Obviously these kinds of improvements require advanced statistical competence, but they may pay off very well both in terms of cost reductions and in the form of better quality and usefulness of the statistical outputs.

Statistics Denmark is internationally recognised for being a pioneer in using administrative data for statistical purposes. Many countries are now applying similar strategies to the extent that their administrative infrastructures permit. After some hesitation Eurostat has also committed itself to this strategy. We think that it is natural that Statistics Denmark should continue to play a leading role in this development, also by being an active participant in the methodological work that is necessary. It should be important for Denmark and its government that Denmark has a strong voice in the European efforts to develop and rationalise production of official statistics.

4.1.2 Direct data collection

A number of properties of the Danish society will always require direct statistical observation and data collection by means of statistical surveys. As far as we can see, the surveys carried out by Statistics Denmark seem to be based upon modern survey design methodology and in accordance with instructions and recommendations from international statistical bodies [Danmarks Statistik 2002e]. However, there is still room for improvements of existing designs. Such improvements require advanced statistical competence but they will usually pay off well in the form of substantial savings and/or quality gains.

There are two major direct data collection methods used by Statistics Denmark: interviews and mailed questionnaires.

Interviews

Statistics Denmark does not carry out any face-to-face interviews. All interviewing is done by computer-supported telephone calls. A growing problem in Denmark like in many other countries is that it is more difficult to get in contact with people via telephone nowadays because of secret telephone numbers and non-registered mobile phones.

[10] For example, a person is more likely to give biased information about his income if the income statement is given for taxation purposes than if the answer is given under guarantees of statistical confidentiality.

Mailed questionnaires

The traditional mailed questionnaire is sent out by surface mail and filled in by means of paper and pencil. Then the questionnaire is sent back to the statistics producer, where the answers to the questions in the questionnaire are entered into a computerised system. In connection with the data entry, the data are coded (in the case of so-called open questions) and checked for possible errors. Sometimes respondents may have to be contacted again for clarifications. This is a very costly and time-consuming process.

Nowadays the paper-based questionnaire is being replaced by electronic questionnaires, and the respondents are offered the possibility to provide their answers electronically, e.g. via the Internet. Statistics Denmark is actively preparing for this development, and the Danish government is supporting this process by organising a common website for questionnaire-based contacts between enterprises and government agencies.

Electronic data collection may in some situations speed up the data collection process and reduce costs both with the respondents and with the statistics producer. Furthermore, electronic data collection has a clear potential of improving data quality, since a lot of checking and data preparation can be done in the same moment as the respondent enters data into the computerised system; incomplete and possibly erroneous data will be detected, while the respondent is sitting at his PC and can immediately correct mistakes.

There are some problems with this development as well. First of all the statistics producer cannot force all respondents to use the same answering mode. Some respondents will not have adequate computer equipment or cannot or do not want to use it for this purpose. Those who have adequate computer support may again prefer different ways of using it. More and more respondents prefer to use Internet-based on-line systems, but some respondent may prefer to send data electronically to the statistics producer in other ways.

Enterprises will also demand better co-ordination between different data collectors, e.g. different business surveys, so that they do not have to report the same or similar data several times.

Statistics Denmark is ready to adapt its operations and production systems to this development, but it will require considerable resources to be able to give respondents the better service that they require, e.g. the possibility to choose the data reporting mode that suits them best, including electronic data interchange (EDI) between the internal administrative systems of a company and the data capturing systems of the statistics producer. This flexibility will also imply methodological problems. What happens with the quality of data (in different respects) when different respondents use different reporting modes, and when even the same respondent may change reporting mode now and then? This needs to be studied carefully by statistical methodologists. On the whole the quality is likely to become better in many ways, but “better” data may be “worse” for certain types of usages, since data that have been collected in different ways at different times for the same or different respondents are likely to be less comparable than data that have been collected in the same way all the time and for all respondents. There are many challenges here for methodologists.

4.2 Statistical outputs: macrodata, microdata, and metadata

The traditional outputs from a statistical office are statistical tables containing estimated values of statistical characteristics, in common language known as "statistics", or *macrodata*. Statistics are used for instrumental or informative purposes by a wide range of user categories: decision-makers in public and private sectors of society, researchers, analysts, students, journalists, politicians, and the public at large.

For economic reasons statistics must be multi-purpose; it must be possible for different users to use the same statistics for different purposes.[11] Nevertheless, the statistics must be reasonably relevant and of reasonably good quality for all these purposes. It is a challenge for the statistics producer to accomplish this. One way of meeting this challenge is for the statistics producer to not only present the statistical figures with some rudimentary text labels, but to present the figures together with suitable illustrations, explanations, definitions, and descriptions, so-called *metadata*; data are described by metadata. The metadata must of course be tailored to the different needs and different conditions and qualifications of different users.

Nowadays it is also practically feasible to give researchers and other qualified users of statistics access to the underlying observations, or *microdata*. In order to maintain statistical confidentiality (which in turn is necessary for a statistics producer, who wants to preserve the respondents' trust) microdata will have to be anonymised before the users are given access to them, even if the researchers have respectable purposes.

4.2.1 Statistics (macrodata)

Like all statistical offices, Statistics Denmark produces a wide range of statistical publications, where the statistics emanating from different surveys and production systems are presented to the users. The publications are disseminated both in printed and in electronic form. In the simplest case the electronic publication is just an electronic copy of the printed publication – or rather the other way around: a printed issue of a publication is just a copy of the electronic publication, a very expensive copy. Statistics Denmark has done a good job in reducing the number of printed copies, especially copies which are distributed free of charge or not at all (so-called shelf-heateners), replacing them by electronic copies that can easily be downloaded from the Internet web-site of Statistics Denmark.

A much more advanced, new dissemination form is Internet-based statistical output databases, represented by *Danmarks Statistikbank*. Statistics Denmark is a pioneer in this field and has based its developments on a system from Statistics Sweden. The co-operation between the two offices in this field started already in the 1980's.

[11] It would be prohibitively costly to produce tailor-made statistics for every unique purpose, especially if the underlying data had to be obtained by means of direct data collection. However, there is also another argument for general-purpose statistics: it facilitates discussions and collective decision-making if all participants base their arguments on the same statistics. Human communication is anyhow problematic since we have all different knowledge, different experiences, and different frames of reference. Because of this, and because we have different values and preferences, we may very well interpret the same (statistical) data in different ways.

Statistikbanken contains basically all aggregated statistical outputs produced by Statistics Denmark. There may be some exceptions, but on the other hand *Statistikbanken* may contain more detailed statistics, and statistics with "more dimensions" than traditional publications. And *Statistikbanken* is much more flexible than electronic publications, since a user may tailor a selection of output statistics to his or her needs, using powerful and user-friendly software tools. The macrodata in *Statistikbanken* are associated with metadata in the form of quality declarations (*varedeklarationer*). It may be interesting to compare the following figures:[12]

Printed publications

Number of printed titles, per year:	466
Number of registered customers:	unknown
Number of subscriptions	6,751
Number of printed copies, per year:	432,812
Number of sold copies, per year:	243,000
Number of free copies[13], per year:	92,465
Number of free copies, own staff	58,000

Electronic publications on the web-site

Number of electronic titles, per year:	467
Number of registered customers:	750
Number of subscriptions:	1,634
Number of sold downloads, per year:	20,000

Statistikbanken

Number of data matrixes available:	820
Number of active[14] registered[15] customers:	26,500
Number of retrievals, per year:	991,000

The usage of Statistikbanken is growing rapidly as shown by the following table:

	1999	2000	2001	2002	2003[16]
Registered customers	660	1,427	32,188	63,325[17]	
Number of retrievals	21,151	87,689	563,500	973,086	1,400,000

[12] Some of the figures are exact, others are approximate. Here we are only interested in orders of magnitude.
[13] Copies given away free of charge, e.g. copies sent to libraries in Denmark and abroad, copies given to students or visitors, "faithful customers", etc.
[14] Inactive customers have been removed.
[15] Customers need not register; about half of the retrievals are made by unregistered customers.
[16] Prognosis.
[17] Before removal of inactive customers; cf footnote 15.

4.2.2 Observation data (anonymised microdata)

Most statistical offices give researchers and qualified analysts some kind of access to anonymised observation data (microdata) for statistical purposes. However, the procedures are often complex, time-consuming, and costly for the researchers, and it is not always that they get what they want in the end, partly because of the necessity for the statistical office to protect the confidentiality of the data, but also because of technical difficulties and bad co-ordination within the statistical organisation. Moreover, the researcher may not get access to the data where he wants it (typically at his own PC at the university), and he may not be able to use the software of his own choice for managing and analysing the data.

Statistics Denmark is a pioneer in finding new ways to give better service to researchers who need access to microdata for statistical purposes. It has recently created a special unit for service to researchers, *Forskerservice*. The technical solution chosen is quite interesting. Although no microdata actually leave Statistics Denmark, a researcher can process microdata sets from his own PC, connected via the Internet to a server at Statistics Denmark, as if the microdata were on his own PC. The only restriction is that he cannot directly download processing results exposed to him on his PC screen; instead he can order the results to be promptly transferred to him via e-mail, and then he can continue with further processing of the results on his own PC, if he so chooses. Thanks to the intervening e-mail procedure, Statistics Denmark retains sufficient possibilities to ensure that no user/researcher is misusing his access rights, e.g. by making massive, systematic attempts to reidentify sensitive data from statistical outputs.

There are a couple of drawbacks with the present version of the system, which we think that Statistics Denmark should do something about. One thing is that standardised documentation of the microdata is largely missing or at least inadequate[18], both for getting an overview of which data a researcher/user could possibly get access to (after due trial and permission) and for interpreting the data in a data set for which he has got access and processing rights. The problem is that Statistics Denmark has only a very rudimentary documentation of observation data (within the TIMES system) and no systematic documentation at all, as far as we have been able to find out, of the processes behind the statistical data. The quality declarations (*varedeklarationer*) that we have already mentioned are not detailed enough and focusing on macrodata rather than microdata.

Another observation that we have made is that the database structure and production systems behind *Forskerservice* could probably be rationalised and made simpler and more cost-effective. As we understand the present system, new databases often have to be compiled when there is a new user or usage. We think that a more general-purpose database structure should be organised, e.g. in the form of a so-called data warehouse, in such a way that in most cases, when a researcher/user gets permission to access and process a certain set of data, this data set should not have to be physically compiled, but it should be definable as a virtual view of the general database structure.

[18] Documentations certainly exist, sometimes even good documentation, but they are not carried out in a standardised way. Hence they are difficult to use, especially for overviews and comparisons.

4.2.3 Pricing of statistical products and services

The pricing policy for statistical products and services of Statistics Denmark is that prices for hardcopy publications should in principle cover all expenses for preparing and printing the publication, but not covering data collection, processing and tabulation. The Internet (PDF) versions are priced as 75% of the printed publications.

Information retrieved from *Statistikbanken* is free.

Individual services are invoiced by their costs.

A reflection here is whether it would not be economically motivated to have a greater price difference between printed and electronic publications. Experiences from other statistical offices show that the producer's cost for letting a user download an electronic document is only a very small fraction of the cost for printing, distributing, and invoicing printed publications. It may even be rational to allow users to make downloads of electronic publications free of charge.

It could also be well motivated to combine a zero price for electronic publications with a higher price (than at present) for printed publications, maybe a considerably higher price. Most "poor" customers, e.g. libraries, would have access to free electronic copies on the Internet, and most of them would not buy printed copies anyhow, even at present prices.

4.2.4 Evaluation

The statistical outputs from Statistics Denmark are extensive, and they are made available to the users in a number of different forms. There is obviously a rapidly growing demand among users for Internet-based outputs, and this is also a convenient and relatively inexpensive way for Statistics Denmark to disseminate its results. On the other hand, we have noted that about half of the visitors to the web-site did not find what they were looking for. Thus Statistics Denmark needs to continue and even strengthen its efforts to make its outputs easy to find and retrieve. Here the development of an adequate system for statistical metadata is of utmost importance.

Furthermore we suggest that Statistics Denmark should invite and encourage other authorities preparing statistics to provide their statistics for inclusion in Statistikbanken. Users of statistics prefer to find all statistics they need in one place, regardless of where, and by whom, they have been produced.

Moving into an era of globalisation, it will be extremely important that the Danish statistics published in Statistikbanken are also available to the many potential users outside Denmark. We strongly support the intentions of Statistics Denmark to extend the English language part of Statistikbanken.

4.3 Systems and processes for statistics production

All statistical production processes have a lot in common, and this makes them suitable objects for standardisation and rationalisation.
Figure 2 shows typical processes and enabling resources for a statistical production process. *Figure 3* gives a very schematic picture of the three major parts of statistics production: input, thruput, and output.

The production processes and enabling resources of a statistical office can be organised in different ways, with different advantages and disadvantages. *Figure 4* shows the classical way of organising the production processes of a statistical office, the so-called stove-pipe organisation. There is a production line for each statistical product, and the production line takes care of all production steps, from beginning to end.

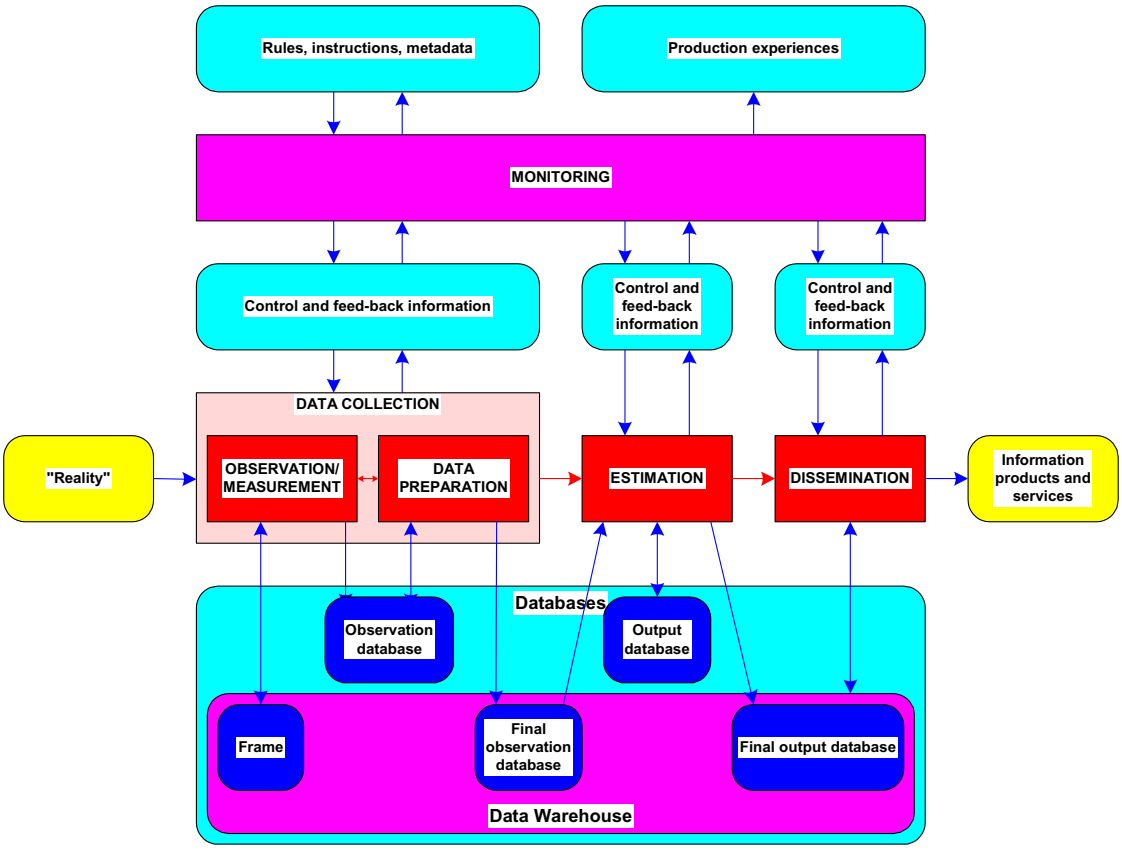


Figure 2. Typical operations in a database-oriented statistical production system.

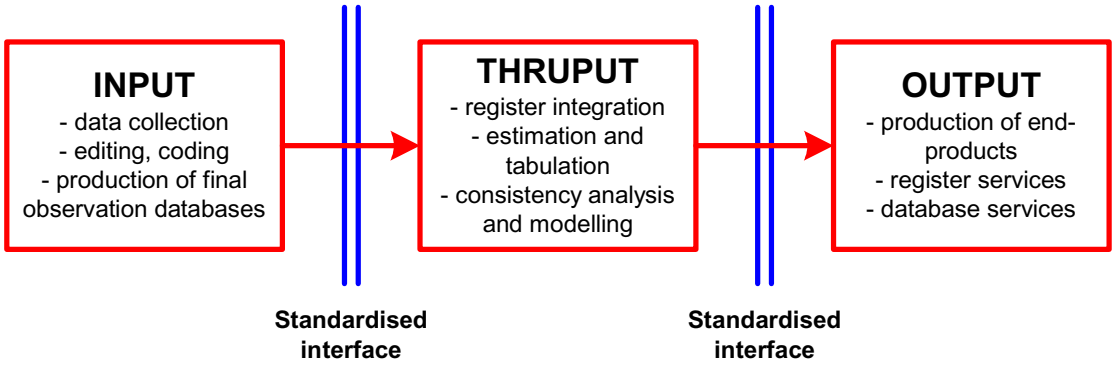


Figure 3. A schematic picture of statistics production: input, thruput, output.

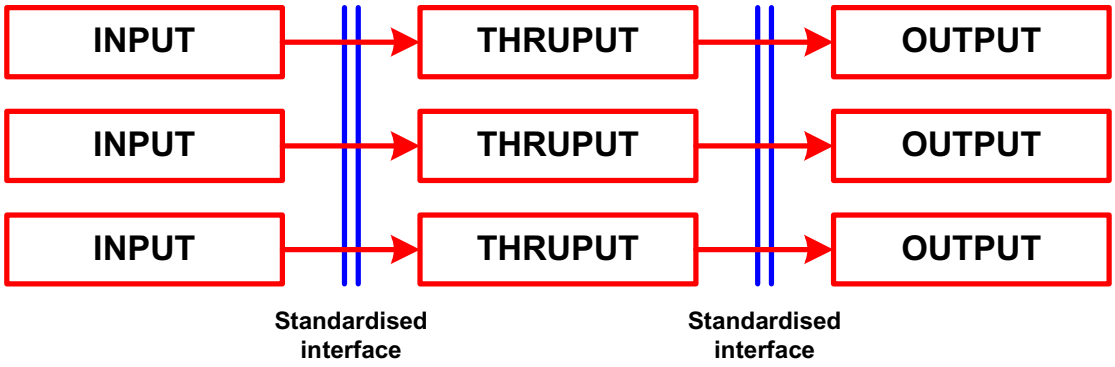


Figure 4. The stove-pipe architecture for statistical production systems.

The stove-pipe organisation is still dominating in statistical offices all around the world. But some statistical offices are trying other approaches. A fundamentally different approach is represented by the so-called clearing-house architecture, schematically described by *Figure 5*, and in more detail by *Figure 6*. Here the traditional production lines have been broken up into the three basic parts: input, thruput, and output. And more importantly, the three parts may now be combined in new ways, enabling inexpensive production of new statistical products by combining inputs from different sources.

According to the clearing-house architecture all inputs are put into the clearing-house[19], where they are organised in such a way that they can be used for many different estimation processes, and many different outputs, now and also in the future; everything need not necessarily be preplanned.

The stove-pipe architecture of production system is usually combined with a formal organisation – like the organisation of Statistics Denmark – where the basic building block is an organisational unit responsible for one statistical product, produced by one input-thruput-

[19] Also called data warehouse with modern terminology.

output chain of processes. Thus the same organisational unit is responsible for practically all steps in the production chain, from beginning to end. The staff members in the organisational unit stick together and feel a strong common responsibility for "their" product. On the other hand, this type of organisation does not encourage contacts with other parts of the organisation, not even with organisational units responsible for very similar products and processes. Thus the potential of learning from others and from good examples will not be fully exploited.

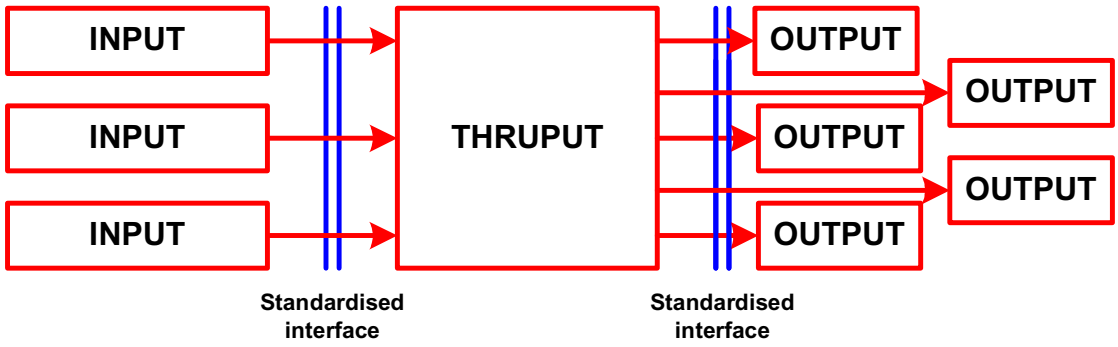


Figure 5. The clearing-house architecture for statistical production systems.

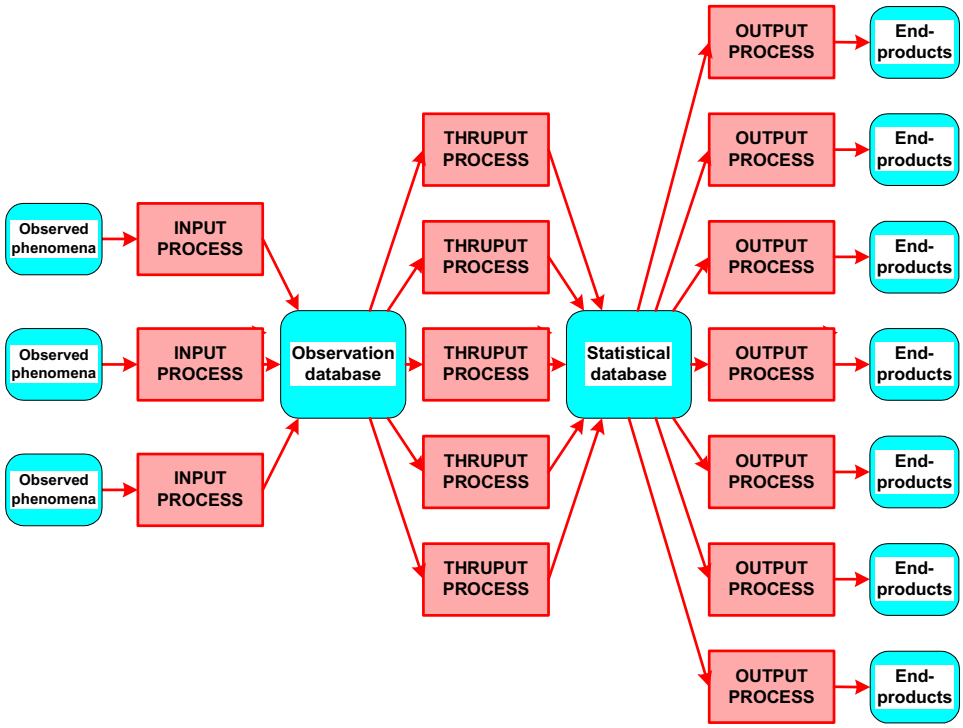


Figure 6. The clearinghouse architecture further elaborated.

An organisation based upon a clearing-house architecture will focus more on types of processes, e.g. data collection, and will encourage standardisation and professionalism with regard to these types of processes.

The clearing-house organisation will also encourage co-ordination to the benefit of external stakeholders (users and respondents). For example, those responsible for output processes will try to tailor these processes to the full needs of different user categories, so that the user will not have to make contacts with a lot of different people within the statistical organisation, who may not even know each other, and may have difficulties to co-operate. On the input side, it will be natural for the production staff to look after the interest of different categories of respondents, so that for example an enterprise can deliver all data to the statistical organisation in a well co-ordinated way, rather than have to send data, maybe with overlapping contents, to different organisational units at different times for different surveys.

By using a clearing-house organisation of processes and data, there will be a multiplication effect, since the same input data can be used for many estimation processes and many statistical outputs, as shown by *Figure 6*. On the other hand, an output tailored to the needs of a certain user may require a compilation of data emanating from different estimation processes and a wide range of data sources.

The clearing-house architecture has a potential for increasing productivity and efficiency in statistics production and for satisfying the demands of users and the requirements of respondents in a better way. However, in order for these advantages to materialise, and in order to avoid problems and mistakes, the processes and the data have to be carefully designed, both from a statistical and from a technical point of view, by means of qualified methodologists and other kind of specialists on statistics production.

In the strategic plans of Statistics Denmark we have found a number of indications that Statistics Denmark is already moving towards a production system organisation that is at least partially inspired by the clearing-house architecture. For example, the production system model illustrated by *Figure 7* is taken from *IT-strategi 2006* [Danmarks Statistik 2002a]. The following four systems can be seen as evidence of this development:

- *Sumdatabasen* and *Statistikbanken*: user-focused integration of statistics (macrodata) on the output side)

- *Forskerservice*: user-focused integration of observation data (microdata) on the output side

- *Det personstatistiske registersystem*: an integrated system for production of person statistics

- *Portal for elektronisk indberetning*: Statistics Denmark participates in an e-government project enabling enterprises to report statistical and other data electronically on one website; respondent-focused integration.

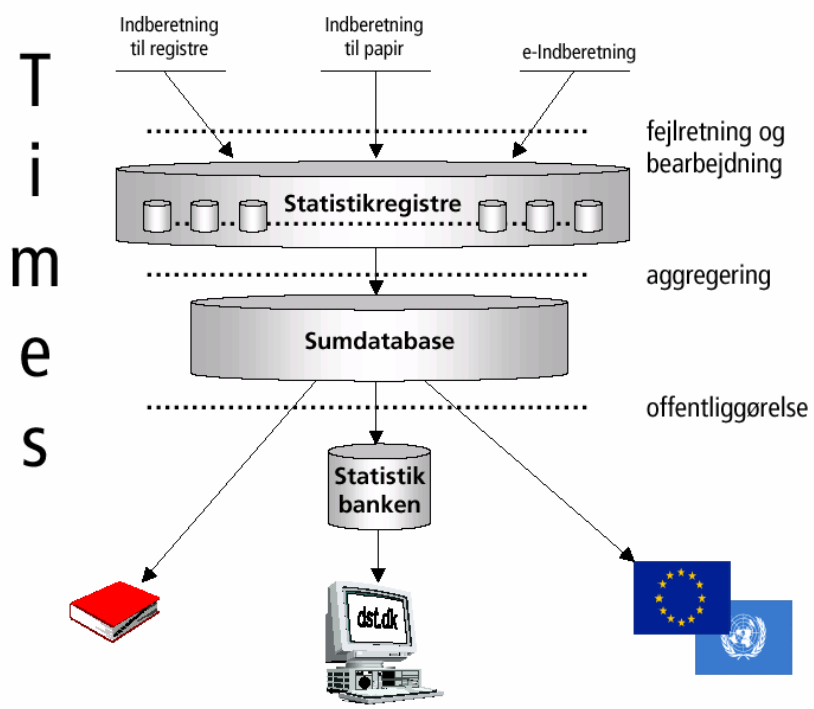


Figure 7. Production system model proposed in IT-strategi 2006.

Provided that Statistics Denmark is able to strengthen its methodological capacity as regards statistical methods and IS/IT, we think that Statistics Denmark – like other statistical offices in advanced countries – have a lot to gain, in terms of efficiency and user/respondent satisfaction, by continuing the already on-going development of moving its organisation of both human and technical resources in the direction of the clearing-house model.

The centralised organisation of official statistics in Denmark facilitates the development towards a well integrated clearing-house model. In more decentralised systems, like in the United States, it is much more difficult to integrate data from different sources and to accomplish desirable co-ordination of processes, both on the input side (respondent-focused co-ordination) and on the output side (user-focused co-ordination). Co-ordination over organisational boundaries is of course more complex and difficult than co-ordination within one single statistical organisation. The need to protect the privacy of respondents and the confidentiality of statistical observation data also makes it difficult to combine data collected by different organisations; it is much easier if all sensitive data can be stored in one database system or data warehouse, which is under the control of one statistical agency.

For similar reasons it is also difficult to outsource core activities in statistics production. It is possible to outsource auxiliary functions like IT and printing operations. Even interviewing and other data collection and data preparation activities can be outsourced, provided that the

operator is bound by a strict contract that ensures the statistical confidentiality. It is difficult to outsource a whole statistical survey, especially when different surveys are highly dependent on each other as they are in a register-based system; then again sensitive data would frequently have to be transferred across physical and organisational boundaries, which creates threats to the security and confidentiality of the statistical data involved.

In Sweden, where the responsibility for certain parts of official statistics production have been decentralised to other agencies than Statistics Sweden, these other agencies have often found themselves too small for carrying out statistics production by themselves. Instead they have made calls for tenders in order to find companies that would be willing to produce the statistics for which they are responsible. However, it has turned out to be very difficult to find companies that have the competence, capacity, and willingness to participate in the tendering process. After about ten years with this decentralised model for official statistics, most statistics are still produced by Statistics Sweden – even those statistics for which other agencies are responsible; they have not been able to find a more efficient statistics producer than Statistics Sweden, even though they have tried very hard in some cases.

5 Quality considerations

For a user of statistics the quality of statistical outputs are obviously of utmost importance. However, quality is a complex concept, and different users may give priority to different quality dimensions. For example, one user may value high precision in the statistical estimates, whereas timeliness is more important for another user. Quality is also a relative concept. What is adequate quality for one purpose may be completely unsatisfactory for another usage. Like beauty, quality is often in the eyes of the beholder. A major challenge for a statistics producer is to describe different aspects of the quality of statistical outputs in such a way that the user himself can draw correct conclusion as to whether the statistics has adequate quality for the usage that the user has in mind.

Good quality of statistical outputs obviously requires good quality of the underlying observation data according to the principle of "garbage in – garbage out". In order to be able to describe the qualities of statistical outputs, a statistics producer must have a good understanding of the qualities of observation data, and these qualities must also be well documented. A good documentation of the qualities of observation data is of particular importance for researchers and other qualified users and analysts of statistical data, possibly in a distant future, when those who once had first-hand knowledge about the data are gone.

A good understanding of the quality of statistical data often requires a good understanding of the processes that have produced the data. For example, it may be important to know how the data have been checked for possible errors and which assumptions have been made in the estimation procedures.

Systematic knowledge about the processes underlying statistical data is also important for a serious statistics producer, who wants to keep the quality of the processes under control in such a way that errors and bad performance can be detected at an early stage and be met by proper corrective actions, which may include modifications of the design of the processes and better training of staff.

5.1 Quality of statistical data and statistical outputs

Statistical institutions from many countries share an understanding of the meaning of quality of statistical outputs. Statistics Denmark expresses quality in five dimensions: relevance, reliability, timeliness, coherence, and accessibility.

5.1.1 Relevance

Statistics should shed light on the most important features and developments within society. They should be adapted to developments within society, so that their contents relate to current and potential user needs, both nationally and internationally.

Statistics Denmark was, like other national statistical institutes, originally serving the needs for statistical information from government organisations and institutions. In more recent years, Statistics Denmark has adjusted to the increasing demands for official statistics from other user groups, and offers today its products and services on the Internet, special electronic media, etc.

To acquire more insight into the users needs, special investigations have been done [Danmarks Statistik 2002c]. The investigations indicated that the use of *Statistikbanken* has become very popular and that the retrieval of statistical tables by the public is remarkably high.

Statistics Denmark has also developed plans for active marketing of their product [Danmarks Statistik 2002d].

5.1.2 Reliability

Statistical estimates should be accurate, and, even more importantly, the degree of accuracy should be known and documented. The picture given of society through statistical figures, analyses, and supporting text should be trustworthy. In order to provide users with statistical figures, when they actually need them (cf timeliness), it is often necessary for the statistics producer to publish preliminary estimates. Provisional figures will unavoidably be subject to a higher amount of uncertainty than later estimates, but they should all the same give a fair picture of reality. Once again it is of utmost importance that the uncertainties associated with the estimates, preliminary or final, are well known and understood by the statistics producer, and well documented in connection with the published figures, so that a user can draw correct conclusions about their usefulness for a certain purpose.

The reliability of published estimates from Statistics Denmark are discussed in the quality declarations (*varedeklarationer*) accompanying all published statistics. However, to the best of our knowledge, so-called variance estimates are not routinely produced and published.

In the long range strategy [Danmarks Statistik, 2001b], reliability is emphasised as one of the fundaments of Statistics Denmark. To compare accuracy of statistics from different statistical institutes is difficult. However, we have found no reason to believe that the Danish statistics should not be as accurate as corresponding statistics in other Nordic countries.

5.1.3 Timeliness

Statistics Denmark seems to be paying particular attention to timeliness, and this is expressed in its work plans. For example, according to the work plan for 2003, it is an explicit goal to reduce the production time for 10 specified statistical products [Danmarks Statistik 2003b]. In contrast to other quality factors, timeliness is easily observed and monitored both by the statistics producer and by the users, and seems to compare well with the performance of other national statistical institutes in the Nordic countries and in Europe.

Here it can be noted that the European Central Bank has complained about an apparent slowness in the reporting of short-term economic statistics by European countries in comparison with what is achieved in the United States. This complaint resulted in a benchmarking study undertaken by Eurostat in co-operation with national statistical offices in a number of EU countries. The results from the benchmarking study are reported in [SPC, 2001]. There are several reasons why the United States is faster in reporting short-term statistics than the European countries.[20] One reason of particular interest is that the United States uses more advanced estimation methods, which permit them to produce preliminary estimates with sufficient and known accuracy much earlier than in European countries, which are not making use of these estimation methods.

In the US, statistics are often built up incrementally as more reliable data become available. Not only the response rate but also the data contents and quality vary between the different releases. The quality of the indicator improves gradually over time through increasing the coverage, checking basic data, replacing proxies by observed data and finally benchmarking the indicator against annual surveys. This is done in a very transparent manner, as the revision size in comparison with the previous release is always published as a rule.

It seems reasonable that European statistical offices, including Statistics Denmark, should redesign their short-term economic statistics to make use of the estimation methods that have enabled the United States to increase timeliness while preserving accuracy.

5.1.4 Coherence

Official statistics should be easily comparable. As far as possible they should be internationally coherent, and coherent over time, conceptually coherent, and presented in a coherent manner.

Statistics Denmark has established the following principles for statistical coherence [Danmarks Statistik 2001b]:

- Statistics must be coherent over time. When there is a need to revise current statistics, Statistics Denmark will strive to establish consistent time series correcting any gaps in statistical information.

- Statistics must be conceptually coherent. As far as possible, statistics shedding light on different aspects of life should contribute to a coherent picture of developments within society as a whole. Towards this end, a given concept will have only one definition when used in a variety of statistical areas.

- Statistics must be presented coherently.

[20] We disregard here the slowness on the European level that is caused by the fact that United States collects observations directly for the union as a whole, whereas data collection in the European Union proceeds in two steps: first data are collected and aggregated within all European countries separately, and then the aggregates are compiled on the European level.

- Statistics must be internationally coherent .

These four principles are to be realised via the strategic objectives for statistical developments, dissemination, and international co-operation.

Statistics Denmark adheres to international standards, wherever applicable, in all its production systems and statistical products.

5.1.5 Accessibility

We have already discussed the wide spectrum of possible sources for dissemination maintained by Statistics Denmark, and commented on the extensive use of statistical information by private individuals and education taking advantage of the easy availability of *Statistikbanken*.

As regards accessibility of both macrodata (*Statistikbanken*) and microdata (*Forskerservice*), Statistics Denmark is at the forefront in an international comparison.

The printed publications of Statistics Denmark have an attractive format and outlay.

5.2 Quality of statistical processes

According to modern quality management principles[21] quality in end-products and efficiency in producing them is highly dependent on a good understanding of the underlying processes, which must be well analysed and documented in a standardised way. Another key factor is that the processes should be designed so as to continuously produce informative feed-back, so-called *process data*, about their own performance in terms of errors and efficiency.

These principles are certainly applicable to statistics production. The data collection process, including subprocesses like observation and measurement (e.g. by means of interviews and mailed questionnaires), data entry, coding (classification of answers to open questions), data editing (checking and correcting).

As examples, let us consider two important subprocesses: interviewing and data editing.

It is well known that there may be a considerable variation in the performance between different interviewers. For a statistics producer it is therefore important to monitor interviewing processes in such a way that unmotivated variations that are potentially negative for the final quality of the data can be promptly detected and prevented. Possible remedies include better training, better tools, and redesigned interviewing procedures.

[21] As established in methods and standards like Total Quality Management (TQM), Business Process Reengineering (BPR), and ISO-9000.

Data editing is arguably the most resource-consuming subprocess in statistics production. Unfortunately it may also be one of the least efficient subprocesses, if inadequate methods are being used. There is a kind of book-keeping tradition in many statistical offices, assuming that every piece of observation data must be checked with the same intensity and that the more you check the better the quality will be. If time and resources are limited – which they always are – these two assumptions are simply wrong.

Instead it is important to design editing methods in such a way that important errors, errors that will influence the final quality of statistics in a significant way, will be detected and corrected with highest priority. There are such methods, e.g. methods known under the label of "macro-editing". Statistics Denmark is aware of these methods, and uses them, but maybe they could be used more extensively and systematically. Macro-editing has the good effect of reducing time and costs and improving quality at the same time.

There are not many statistical offices yet that produce feed-back data, so-called process data, from their processes in a systematic and routinely fashion. However, there is an on-going methodological development in this area, and it is important that Statistics Denmark follows and participates in this development.

According to documents that we have studied, e.g. *Strategi 2006* [Danmarks Statistik 2001b], Statistics Denmark has internal quality assurance guards against errors and statistical uncertainty, where the heads of division, together with their staff, are responsible for quality assurance, and where the Dissemination Centre plays an active role. An extensive quality assurance policy exists for statistical areas of central importance: statistics referring to the balance of payments, foreign trade, the national accounts, public finances, unemployment and salaries.

Despite this, experience shows that on occasions inaccurate statistics have been published. The policy in such cases is to publish corrected statistics as soon as possible.

5.3 Documentation and metadata

In principle, the concept of "metadata" covers all kinds of descriptions of data, or "data about data", regardless of whether they are formalised (e.g. for computers) or free texts (for human beings), and regardless of whether they inform directly about data (e.g. in the form of quality declarations, "*varedeklarationer*", or indirectly (e.g. by describing processes and resources used in the production of data). However, it is common to use the term "documentation", rather than "metadata", for verbal and relatively informal descriptions of data and processes.

Yet another category of "metadata" is documented general knowledge, e.g. in the form of textbooks, scientific papers, handbooks, course material. Documented knowledge is nowadays managed and made available in a systematic way by means of computer-supported systems like websites on the Internet and/or internal intranets, and so-called knowledge management systems, content management systems, and expert systems (knowledge-based systems).

There are many potential users of statistical metadata, i.e. metadata about statistical data and processes behind statistical data. The most obvious users of statistical metadata are users of statistics. They need metadata (a) in order to identify, locate, and access statistical data of potential relevance for their purposes; and (b) in order to process, analyse, and interpret statistical data, once they have retrieved them.

Producers of statistics need metadata for the same reasons as users of statistics, but they also need metadata and documentation in order to operate and monitor statistical production processes, for maintaining production systems, and for training new staff members.

Designers of statistical production processes need documented knowledge about how to design statistical production systems, e.g. in the form of handbooks and documents informing about so-called "current best methods and practices". On the other hand, when designers design statistical production systems, they themselves *generate* documentation in the form of specifications of the systems that they are designing. If properly documented and organised, the natural outputs from design processes can be used by users and producers of statistics for the purposes that we have just described (operation, monitoring, and maintenance of production systems, and training of staff members).

Managers on different levels need metadata in the form of process data that inform about the quality and efficiency of the production systems for which they are responsible.

Respondents need metadata in the form of explanations of (a) the purpose of surveys in which they are asked to participate; and (b) the meaning of questions they are asked to answer, and instructions about how to provide the answers.

Last but not least, metadata are also used for "driving" computerised statistical production processes in a more or less formalised and automatic way. All software products require different kinds of metadata, e.g. identifiers, name labels, and technical descriptions of data sets and variables that are to be processed by the software.

Since the advent of computers, statistical offices have been very good at systematising and automating the management and processing of data, and this has led to an impressive rationalisation of statistics production. There is a corresponding potential to rationalise statistics production by systematising and automating the management of metadata, but this potential is still far from being fully exploited by statistical offices. Furthermore, better documentation and metadata management is not only a tool for rationalisation of statistical design and production processes. As has been indicated by the examples above, documentation and metadata are also prerequisites for responsible and efficient usage of statistical data and for proper management and control of statistical production systems and statistical organisations.

Metadata and documentations are themselves elements of quality and they describe other aspects of quality. In the five-dimensional quality concept applied by Statistics Denmark, metadata and documentation would belong to the quality dimension called "accessibility". This dimension is often labelled with the somewhat broader term "availability". Statistical data that are not properly described and explained are not really available to the users, and if

users use statistical data that are poorly described and explained, there is a great risk that they will misinterpret the data. Here the statistics producer has a great responsibility.

Statistics Denmark is strong in certain metadata areas and weak in others. On the whole Statistics Denmark is not very different from other statistical offices in these respects. On its website, and in connection with Statistikbanken, Statistics Denmark gives good overviews of its products and services. The quality declarations (*varedeklarationer*) provide sufficient information about the contents and quality of the statistical outputs for many categories of users. However, expert users, like analysts and researchers, need more detailed documentation of the statistical data[22], and the processes behind the data, than is available at present.

The newly released TIMES system is a step in the right direction. It does not inform about processes, but it should give detailed information about variables and values, and how they are defined. TIMES is available on the Internet, but for the time being it is incomplete and it does not always seem to work properly.

As far as we have been able to find out, there is no systematic process documentation at Statistics Denmark at present. Neither are there any systematic routines for producing and using process data in the operation, monitoring, and evaluation of production processes.

The documentation of production systems, processes, and microdata is clearly not satisfactory at present at Statistics Denmark, and systematic actions against this deficiency should be taken as soon as possible. It should be emphasised that the documentation should cover both statistical (contents-oriented and methodological) and IT aspects. If resources are scarce, which they are, priority should be given to contents-oriented and methodological aspects.

A positive factor should be mentioned here. Several developments at Statistics Denmark, e.g. the pioneering and systematic use of administrative data for statistical purposes and the consistent implementation of *Statistikbanken* and certain IT policies (e.g. systematic usage of standardised IT tools), demonstrate that Statistics Denmark has a remarkable competence as an organisation to carry out major projects and achieve strategic goals. This ability is certainly not common in national statistical institutes, which are often described as loose associations of "local kingdoms", which do not bother very much about central directives and common interests of the organisation as a whole.

In summary, Statistics Denmark certainly has the same problems as other statistical offices in the area of documentation and metadata, but there is a good prognosis that Statistics Denmark could tackle these problems better than many others. A prerequisite for success in this area is the availability of adequate financial and methodological resources.

Finally, the following quotation from *Strategi 2006* [Danmarks Statistik 2001b] indicates that Statistics Denmark is aware of what needs to be done:

[22] This is obvious for users of microdata, e.g. customers of *Forskerservice*, but also in connection with advanced analyses of aggregated statistics, it may be necessary to have good knowledge about how the data behind the aggregated statistics have been obtained and processed, in order to be able to judge the quality and usefulness of the output statistics for a certain usage and purpose.

At institutionen arbejder på et videnskabeligt grundlag indebærer, at professionalisme og faglige hensyn er afgørende ved valg af metoder for dataindsamling, bearbejdning, opbevaring og formidling af statistiske data. Det indebærer også, at hele denne proces er veldokumenteret.

5.4 Evaluation

If we take the five quality dimensions one by one and make an international outlook, we come to the following judgments:

Relevance: The contents of Danish official statistics are very similar to the contents of official statistics in comparable countries.

Reliability: Although systematic information about reliability is scarce in Denmark (like in other countries), after studying products and production processes at Statistics Denmark we see no reason to believe that Danish official statistics should not have the same reliability as official statistics from comparable countries.

Timeliness: As regards timeliness, Statistics Denmark seems to compare favourably with most other countries in Europe.

Coherence: Statistics Denmark has ambitious goals for coherence in Danish official statistics, and it has achieved some of these goals by adhering to international standards, wherever applicable.

Accessibility: This is an area where Statistics Denmark is at the forefront. *Statistikbanken* and *Forskerservice* provide excellent service both to specialists and to the public at large.

Adequate documentation and metadata are prerequisites for all quality dimensions mentioned above. Statistics Denmark has useful quality declarations for all its statistical end-products, and they are easily available to the users on the Internet. Documentation of observation registers (microdata) and production systems are largely missing and need to be substantially improved. However, Statistics Denmark is not worse than most other statistical offices in this respect.

According to its strategies and plans, Statistics Denmark has ambitious plans for systematic quality work, and it carries out so-called quality projects on a regular basis; these projects are few but seem to be realised in a professional and competent way.

6 Overall efficiency of Statistics Denmark

In this chapter of the review report we will try to make an overall evaluation of the efficiency of Statistics Denmark in comparison with statistical offices in other countries. We will first discuss the following efficiency components:

- production costs
- production volumes
- quality of products

And then we will put these partial evaluations together into a comprehensive appraisal.

6.1 Costs

We shall make use of a study [Öberg, 2002] made recently for the Swedish government by a committee led by Svante Öberg, Director General of Statistics Sweden.

Table 1: Employees in official statistics and populations 2001 (Source: Öberg 2002)

Country		*Employment in official statistics*	*Population (Mill.)*	*Employment per 1000 inhabitants*
Sweden	*SE*	1094	8,9	0,12
Denmark	*DK*	625	5,4	0,12
Finland	*FI*	1099	5,2	0,21
Norway	*NO*	990	4,5	0,22
France	*FR*	9228	59,2	0,16
United Kingdom	*UK*	6122	59,8	0,10
Germany	*DE*	9000	82,3	0,11
Netherlands	*NL*	2592	16,0	0,16
United States	*US*	38000	285,0	0,13
Canada	*CA*	8500	31,1	0,27
Australia	*AU*	3069	19,6	0,16
New Zealand	*NZ*	965	3,9	0,25

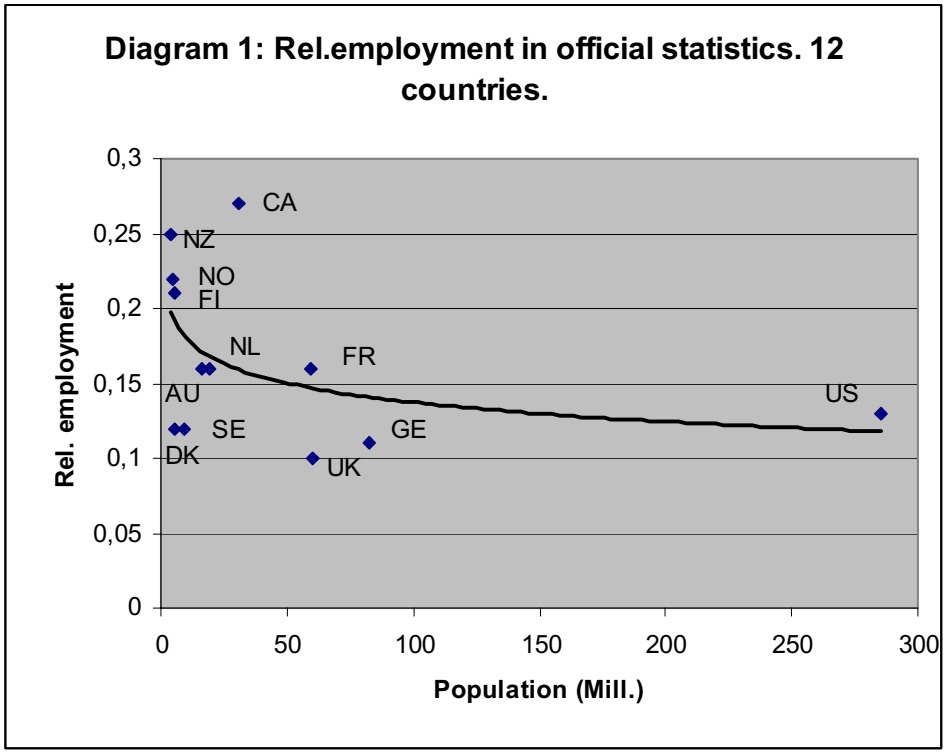
Table 1 shows the number of persons employed for production of official statistics in 12 different countries. A number of adjustments have been made in order to make the figures as comparable as possible. For example:

- If official statistics are produced by several agencies, not only by the central statistical office, all producers have been included, or at least the most important ones.
- If a statistical office does other things than producing official statistics, e.g. if it has some administrative tasks or produces statistics or services that are financed in some other way

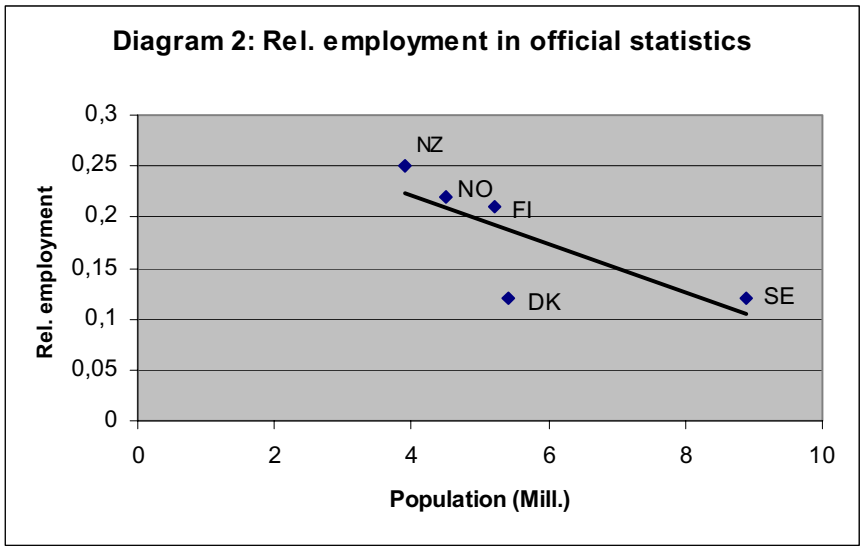
than over the state budget, the corresponding employees have been excluded from the figures.

The last column in *Table 1* shows the number of employees in official statistics in relation to the size of the population in the respective countries. This entity is called "relative employment" in the following diagrams.

There are obvious difficulties in making these kinds of comparisons. For example, there is little reason why costs for statistics production should be directly proportional to the size of the population. *Diagram 1* indicates that there may be a (non-linear[23]) relation between the employees required for official statistics and the size of the population.



[23] The relation is non-linear because of economies of scale, as further discussed below.



In *Diagram 2*, the situation for the 5 countries with a population less than 10 million is depicted. The diagram shows a significant relation between need for employees in official statistics in countries with similar administrative infrastructures. This diagram clearly indicates that Statistics Denmark is a low-employment producer of official statistics among comparable statistical offices. Data for Finland, New Zealand, Norway and Sweden fit well to a linear relationship between relative official statistics employment and population size, according to which Statistics Denmark should have had several hundreds more employees.

Both diagrams indicate, not surprisingly, that there are economies of scale in statistics production. Some reasons for economies of scale are:

- The costs for designing and maintaining a production system are not dependent on the volumes of data processed by the system.
- In sample surveys it is the absolute size of the sample that determines the precision, regardless of the size of the population.
- In secondary systems like the National Accounts, based on aggregated data from other surveys, the computations and analyses that have to be made are more or less the same in all countries, regardless of size.

Diagram 2 may be interpreted in several ways. The official statistics of Denmark may be produced much more efficiently than statistics of the four other countries. Even though the official statistics of Denmark appears to be effectively produced, it is unlikely that the other four countries have less efficient statistical systems. Other interpretations and explanations must be looked for. We will return to this question in the following sections.

6.2 Volumes

The next question then is whether Denmark produces as much official statistics as other countries. As shown by different reports that we have studied, Denmark produces more or less

the same statistics as the other countries, partly because of EU membership and other international obligations; see for example the table below showing the results from another study of production of official statistics in Denmark and 6 other European countries [Danmarks Statistik, 2003f], Chapter 4, Table 4.5.

Produktionen af officiel statistik i Danmark og de øvrige 6 lande

		Person-statistik	Økonomisk statistik	Landbrugs-statistik	Tværgående statistik	Total portefølje
DK	Statistikinstitutionen	32	52	8	5	**97**
	Andre myndigheder	8	14	2	4	**28**
	Udføres ikke	6	3	1	0	**10**
NO	Statistikinstitutionen	35	54	5	8	**102**
	Andre myndigheder	7	9	5	0	**21**
	Udføres ikke	4	6	1	1	**12**
SF	Statistikinstitutionen	34	56	3	9	**102**
	Andre myndigheder	9	11	7	0	**27**
	Udføres ikke	3	2	1	0	**6**
SV	Statistikinstitutionen	34	64	6	9	**113**
	Andre myndigheder	9	3	5	0	**17**
	Udføres ikke	3	2	0	0	**5**
NL	Statistikinstitutionen	37	65	7	9	**118**
	Andre myndigheder	3	3	2	0	**8**
	Udføres ikke	6	1	2	0	**9**
AU	Statistikinstitutionen	24	41	8	6	**79**
	Andre myndigheder	14	22	1	3	**40**
	Udføres ikke	8	6	2	0	**16**
IRL	Statistikinstitutionen	21	46	6	2	**75**
	Andre myndigheder	16	9	5	6	**36**
	Udføres ikke	9	14	0	1	**24**
Antal emner i alt		46	69	11	9	**135**

Anm. Tabellen viser, hvor mange af spørgeskemaets emner, som er dækket af det pågældende lands officielle statistik i enten den nationale statistikinstitution eller af andre myndigheder. Grupperingen af statistikker i person-, økonomisk, landbrugs- og tværgående statistik følger Eurostats arbejdsprogram.

Because of the economies of scale, just mentioned, all data volumes do not affect all kinds of production costs in the same way.

Data collection costs, including observation/measurement and data preparation costs (coding, editing, etc) are by and large proportional to the number of observed objects (persons, enterprises, etc) for the same kind of survey. Data from administrative sources are of course much less expensive to collect than similar data collected by means of direct observations, but it should be noted that both directly and indirectly collected data will require a certain amount of data editing (checking and correction).

With today's information technology the costs for aggregating data are almost negligible, regardless of the volumes of observation data aggregated. Instead the total costs for aggregation and estimation processes in a statistical office tend to be a function of the number of independent estimation designs that have to be developed and maintained. If different

statistical offices use similar designs and have a similar number of statistical products with similar ambition levels, their costs for estimation processes should be more or less the same, regardless of population sizes. This is further emphasised by the fact that in sample surveys it is the absolute size of the sample (n) rather than the size of the population (N) that determines the precision of the statistical estimates. The sample sizes are almost independent of the population size, provided that the same level of certainty of the estimates is to be obtained. However, in bigger countries there tend to be a stronger need for more geographically disaggregated estimates, demanding bigger samples.

As has already been mentioned, for secondary products like the National Accounts, the volumes of observation data underlying the macrodata analyses should have very little, if any, impact on the costs of the modelling work and computations involved.

Since Statistics Denmark produces more or less the same kind of statistics as other countries, these analyses of the effects of different volumes of observation data do not give us reason to change the conclusion drawn from *Diagram 2*. Statistics Denmark certainly has a structural advantage in comparison with many other countries because of the good conditions that exist in Denmark to use administrative data for statistical purposes. Similar possibilities exist in the other Nordic countries. In *Diagram 2* it is only the comparison with New Zeeland that may have to be reconsidered to a certain extent when we take the administrative infrastructure into account.

6.3 Quality

Another possible explanation of the relatively low use of manpower in Danish official statistics, shown by *Diagram 2*, could be that official statistics produced by Denmark has a lower quality than the corresponding statistics produced by the other four countries in the comparison. When we discussed this matter quite extensively in Chapter 5 of this report, we did not find any indication of inferior quality in Danish statistics in comparison with official statistics produced by other countries.

In order to come to this conclusion we have used different kinds of evidence, notably the published statistical products as such, quality declarations of published products, and interviews with staff members responsible for the processes behind the products. We have also checked with other experts, who are knowledgeable about Danish statistics, and it seems quite clear that Danish statistics has a good reputation from an international point of view.

In summary, Danish statistics are, according to our best judgment, as relevant, reliable, and coherent as the official statistics of other countries. As regards timeliness and accessibility, Statistics Denmark is among the best producers of official statistics, not least because of its extensive use of standardised publishing processes and Internet-based user services like *Statistikbanken* and *Forskerservice*. Like in other countries, documentation and metadata are weak points at Statistics Denmark and need to be improved.

We have noted some worrying signals. Although the staff of Statistics Denmark are well motivated and understand the needs for methodological evaluations of statistical products and

production processes, they have great difficulties to find the time and resources for such work. There is a striking shortage of methodological expertise, both in traditional statistical methods and in other disciplines that are relevant for statistics production, e.g. IS/IT and behavioural sciences. There are some very good methodological experts at Statistics Denmark, but they are very few.

We have also noted that Statistics Denmark experiences growing difficulties, because of lack of resources, to participate in international co-operation on an adequate level.

These worrying circumstances do not necessarily imply drastic quality impairments in the short run. It is possible to survive on the existing methodological capital for some time. However, in a longer time perspective there will be growing risks of errors and other quality deficiencies in the statistical end-products.

6.4 Evaluation

It could rightfully be asked, whether Statistics Denmark could really produce statistics of the same quality as comparable countries that have more resources. Could it be that all those other countries are much less efficient than Statistics Denmark. Naturally some of them could be, but it is not likely that all of them are.

A possible explanation is that the quality of some processes in the production systems of Statistics Denmark have in fact started to deteriorate, but the deterioration process has not yet gone far enough so as to result in visible deficiencies in the end-products. For example, when resources are scarce it could be tempting to be a bit more tolerant in the checking of observation data, accepting suspicious data without deeper investigations a little more often than before. And evaluations of production processes may be done with less scrutiny and less frequently – or maybe not at all. Deteriorations of this kind in the quality of the processes may go on for some time (cf corrosion) before the effects become manifest and result in striking errors and other visible deficiencies in the quality of the statistical end-products.

Another, partly related explanation of how Statistics Denmark can operate on a significantly lower resource level than other comparable statistical agencies is that Statistics Denmark – because of the resource restrictions, especially as regards methodological capacity – has cut down on development activities and investments in improvements of the production systems. Like quality deterioration (as just described), gradual lowering of ambition levels in future-oriented development work may not cause any immediate disasters, but in the long run Statistics Denmark may find it impossible to keep pace with the development in other countries. And then the efficiency of the production systems may decrease quite dramatically.

During our study of Statistics Denmark we have seen certain indications that both these threats may be real. We have seen that ambitious staff members have great difficulties to find time, money, and persons for quality projects and development activities that need to be carried out, and we have been told that quality control procedures may not always be carried out so rigorously as would be desirable and maybe necessary – if one wants to avoid embarrassing errors in the statistical results.

Thus our explanation of the situation described in *Diagram 2* is that the official statistics of Denmark is - at this moment - efficiently produced; however, resources which other countries use for methodological and technological improvements to meet future requirements, are not available in the same amount to Statistics Denmark. If our explanation is correct, and if the resources available to Statistics Denmark are not increased, the consequences will be an accelerating process of decreasing volumes and deteriorating quality of official statistics in Denmark, when compared with other countries.

The bottom line is that Statistics Denmark has notably less financing from the government than statistical offices in comparable countries. At the same time, Statistics Denmark produces official statistics with scope, contents, and quality fully comparable with the official statistics produced by those other countries, for example the other Nordic countries. The scarce financial and methodological resources of Statistics Denmark imply, if proper steps are not taken, growing risks of deteriorating process quality, errors in statistical end-results, obsolete productions methods, and inefficient production systems.

7 Conclusions

One way of summarising our findings during this review is to perform a so-called SWOT[24] analysis, where we identify major strengths, weaknesses, opportunities, and threats and suggest some possible actions in view of these observations.

A more conventional type of summary of our report can be found in its very first chapter, called "*Executive summary*". That summary follows the structure of this report.

7.1 SWOT analysis

7.1.1 Strengths

- centralised organisation of statistics production in Denmark
- independence and professionalism
- dedicated staff
- cost-effective production
- persistent implementation of strategies and policies
- statistical use of administrative data
- *Statistikbanken*
- *Forskerservice*
- standardised software tools
- printing processes and tools well integrated with IS/IT, both technically and organisationally

The centralised organisation of statistics production in Denmark serves the country well. In combination with the constitutional independence and professionalism of Statistics Denmark, it enables Statistics Denmark to be a well reputed producer of official statistics, when measured against international standards and professional codes.

Statistics Denmark is also a cost-effective producer of official statistics, when compared with statistical offices in countries of similar size and infrastructure.

Statistics Denmark has been at the forefront in some important developments, notably the extensive and systematic use of administrative data for statistical purposes, and the launching of powerful, Internet-based user services like *Statistikbanken* and *Forskerservice*. In comparison with many other statistical offices, Statistics Denmark has a remarkable ability to implement new strategies and policies in an effective way throughout the organisation. The developments just mentioned are good examples of this. The consistent use of standardised IT processes and tools is another example.

[24] SWOT = Strengths Weaknesses Opportunities Threats.

It is important that all these strengths are taken good care of and that they are further exploited in the future. Thus Statistics Denmark should make use of its well documented ability to persistently implement strategies and policies in a few areas that need attention right now. For example, we think that Statistics Denmark should implement standardised documentation procedures for its processes and observation data as soon as possible. And we think that Statistics Denmark would have a lot to gain from speeding up the outphasing of the mainframe and from further simplifying and rationalising its IT infrastructure. Statistics Denmark should also use the momentum that it has already gained in its successful, Internet-based services by making these services even more attractive in the future. In Denmark, like in other countries, official statistics have a large, unexploited potential for productive usages both in private and public sectors.

7.1.2 Weaknesses

- small financial resources in comparison with comparable statistical offices
- small, vulnerable organisation, dependent on individual key persons
- below critical mass as regards methodological experts in strategic fields
- relatively few employees with academic education
- little co-operation with universities, especially in methodological fields
- complex IT infrastructure (three platforms)
- insufficient documentation as regards microdata and processes

Statistics Denmark cannot do very much about the fact that Denmark is a small country with limited resources. Although there is no reason why Denmark should spend much less on official statistics than comparable countries, it will always be difficult for Statistics Denmark, being a small organisation, to maintain a critical mass of expertise in fields of strategic importance for statistics production. This makes it even more important that Statistics Denmark makes everything it can to economise with its resources in other areas, so that it can secure enough resources for methodologists and other strategic expertise. Statistics Denmark has already done a lot for standardising and rationalising its production systems and technical infrastructure – but we have pointed to some areas where more can be done. We have also pointed to existing potentials of further exploiting co-operation and deliberate division of labour with universities and with statistical offices in other countries.

To secure long-term efficiency we also think that Statistics Denmark should consider an increase in the number of academically educated staff members, also in the IS/IT area.

Thanks to the new possibilities offered by the on-going rapid IT development, the number of users and usages of statistical data is likely to grow drastically in the future. Many of these new users are not familiar with the statistical data they are using, or with statistical methodology. Thus the statistics producer will have to take a larger responsibility for descriptions and explanations of the statistical outputs than they needed to do in the past. This requires good documentation and metadata. Otherwise there is a risk for information chaos and misinterpretations and misuse of statistics.

Demands from researchers will also continue to increase rapidly, and it will not be possible for Statistics Denmark to serve all these users on an individual, face-to-face basis. On the other hand these users are typically quite competent and are able to solve most of their problems themselves, provided only that the statistical data and the processes behind them are properly documented.

Systematic documentation of good quality is also essential for the possibilities to learn from experiences and to transfer knowledge between staff members.

7.1.3 Opportunities

- growth potentials in paid services and international assignments
- intensified international co-operation with systematic division of labour
- more co-operation with universities (positive effects both ways)
- a modest increase in the amount of methodological expertise could lead to substantial cost reductions and/or quality improvements

There are many worthwhile challenges for a larger number of statistical methodologists at Statistics Denmark: improving the quality and efficiency in the use of administrative data for statistical purposes, rationalising costly data editing processes, reducing costs and/or improving quality in sample surveys by means of more efficient sample designs and estimation procedures, developing efficient designs where administrative data and survey data are used in new, productive combinations, etc.

Similarly, there are challenges for IS/IT methodologists and strategists to transform the traditional stove-pipe architecture of production systems into a more powerful architecture based upon the clearing-house model. Thus Statistics Denmark will be able to produce larger volumes of useful information for the users, without having to increase the resource-consuming data collection work.

Paid products and services show good growth rates at the same time as the government budget for official statistics has been cut down. Paid products and services now account for about a third of the total turnover of Statistics Denmark, which is comparable with the picture in other countries that are allowed to market themselves in this way. This is an indication that Statistics Denmark is a competitive producer of statistics.

In order to improve its financial situation Statistics Denmark may try to further expand its paid services (without impairing its public goods and services). It may also further exploit the possibilities to undertake paid consultations for the European Union and others. Finally, Statistics Denmark may get more value from its own development activities by co-operating more actively and systematically with statistical offices in other countries and with universities in Denmark and abroad.

7.1.4 Threats

- further budget cuts

- decentralisation of responsibilities and tasks
- losses of key persons may lead to severe effects as regards competence and quality
- requirements for more statistics from the European Union
- methodological requirements from the European Union
- decreasing willingness from citizens and enterprises to provide data for statistical purposes, and decreasing availability among respondents

As for the first items in this list, Statistics Denmark must have an on-going constructive dialogue with the government. Hopefully this report can provide some useful material for such discussions.

As regards requirements from the EU, Statistics Denmark and the Danish government have a common interest to ensure that rational procedures for statistics production are used within the *European Statistical System* (ESS), and that Denmark is not prevented from using production methods that are most suitable in view of the administrative infrastructure of Denmark. Here it is important that Statistics Denmark is very active on the European arena, and that it can provide professionally and methodologically sound arguments. As we have pointed out several times in this report, this requires Statistics Denmark to secure adequate resources for methodological work and to recruit personnel with a strong educational background.

The best way for Statistics Denmark to improve motivation among respondents to provide data is to explain and demonstrate the usefulness of statistics in different ways. Making statistics available on the Internet in attractive ways is a good step that Statistics Denmark has taken, but more can be done. Another way of making respondents more co-operative is by giving them possibilities to provide data in ways that are convenient for them. This development is also underway in Denmark.

7.2 Some final words

The system for production of official statistics in Denmark has a centralised organisation with Statistics Denmark as the responsible agency. Statistics Denmark is characterised by independence and professionalism and is able to safeguard the objectivity and impartiality of official statistics and to protect the privacy of respondents and the confidentiality of observation data from individual persons and enterprises.

Professionalism is a good starting-point for quality and efficiency in processes and end-products. Professionals know that every organisation has a lot to gain from communication and exchange of experiences with colleagues inside and outside the organisation, e.g. in the form of systematic comparisons and benchmarking activities. National statistical agencies, like Statistics Denmark, are relatively unique organisations in their respective countries, but on the other hand the statistical agencies of different countries have very similar tasks and often find it natural and rewarding to co-operate. Statistics Denmark is well aware of these possibilities and has exploited them well, to the benefit of the quality and efficiency of the Danish statistical system.

Co-operation with universities and research institutes can be another useful instrument for developing the competence and methodology of a statistical office, at the same time as such co-operation can make the academic staff on all levels (from students to professors) more interested and inclined to devote their time and efforts to problems that are relevant for producers of official statistics. Statistics Denmark has used these opportunities to a certain extent, but it can do much more.

Professionalism and methodological expertise is a precondition for sustainable efficiency of a statistical office. In the short run a statistical agency may be able to live on a competence and methodological capital that it has already built up over a period, but if the capital is not maintained and renewed, the quality and efficiency of the statistical office will deteriorate at an accelerating speed, with embarrassing errors in statistical end-products as well as organisational rigidity and inefficiencies as inevitable consequences.

For the time being Statistics Denmark is an efficient producer of official statistics of good quality. However, there are certain worrying signs. In comparison with other national statistical agencies that are subject to similar requirements and operate under similar conditions as Statistics Denmark, Statistics Denmark has remarkably less resources at its disposal than the others. One explanation could be that all the other agencies are remarkably inefficient, but that does not seem very likely. Instead we think that an important explanation is that Statistics Denmark has rationalised its activities to the extent that the methodological capital cannot be properly maintained any longer, at the same time as margins have shrunk, and the risk for errors and other deficiencies are increasing. This is not just speculation – there is some hard evidence. The number of methodologists is very small in international comparison, and it has decreased over recent years. The percentage of staff with an academic education is smaller than in comparable statistical offices in other countries. There are growing difficulties for Statistics Denmark to find time and resources for urgent quality evaluations and development projects, as well as for active participation in joint efforts on the international level.

Statistics Denmark has skilfully exploited its possibilities to use administrative data for statistical purposes. Advanced statistical methods can be used in order to reap more benefits from this advantage, e.g. by means of combining register data with data from sample surveys in even more elaborated ways than at present. Once again Statistics Denmark would have to have more methodologists than it has at present in order to be able to use these possibilities. It is also important for Statistics Denmark to have the methodological competence needed in order to defend and develop the register-based strategy for statistics production on the European level. Eurostat has not until recently accepted that this is a strategy that should be promoted, and there are still concerns about certain methodological problems. Statistics Denmark should be at the forefront in efforts to solve these problems, not least in order to ensure that Denmark can continue to pursue this very rational strategy for producing official statistics of good quality and with much less work on the part of the respondents than would be required if traditional statistical surveys had to be used.

Statistics Denmark provides good services to its users in a very efficient way by using Internet-based instruments such as *Statistikbanken* and *Forskerservice*. However, documentation and metadata have to be further developed and properly used in the dissemination and presentation systems, so that users will not misinterpret the statistical data,

and so that they can judge for themselves whether certain data can be used for a certain purpose or not, and whether different statistical data are comparable with each other. Better documentation is also needed for the maintenance and improvement of production processes, as is a well designed feed-back of data from the processes, informing about the performance of the processes, so that the processes can be promptly modified in cases of less than optimal functioning.

Data collection and data preparation (entering, coding, checking, and correcting observations) are the most resource-consuming operations in statistics production. Statistics Denmark has done a lot to keep these costs down by using standardised software providing efficient computer-support to the processes, by introducing checking methods based on statistical methodology (so-called macro-editing), and by offering respondents to report electronically via a common web-site for the government (*digital forvaltning*).

Another possibility to increase the efficiency of statistics production is to organise the collected observation data – data from administrative sources as well as data collected directly for statistical purposes – in such a way that they can easily be combined and reused. In order to facilitate this, one may organise statistics production around a so-called clearing-house function, or data warehouse. Incoming data from different sources are checked for possible inconsistencies and then stored and described in a standardised way. After that they can be combined and processed in a flexible way and contribute to a wide range of statistical outputs. One and the same piece of input data may thus, through different transformation processes, contribute to many different outputs, and an output tailored to the needs of a particular user for a particular purpose may be obtained by combining data emanating from many different input sources. Statistics Denmark has started to exploit these possibilities in connection with *Statistikbanken*, *Forskerservice*, and *Det personstatistiske registersystem*.

The movement towards a clearing-house based model for statistics production system is an example of structural changes that could improve the productivity and efficiency of official statistics. Questions have been raised whether it would not be possible to further improve the efficiency of statistics production by making other types of structural changes, such as outsourcing functions, processes, or whole statistical products. Many statistical offices, including Statistics Denmark, have already outsourced one or more auxiliary functions such as computer operations, printing, interviewing, and various administrative tasks, often with good results. One precondition is that there is a well functioning market, where several operators are competing for outsourcing contracts. Another precondition is that the task to be outsourced can be well defined so that the performance of the operator can be monitored and evaluated.

It is much more difficult to outsource core activities and whole statistical products. The work on a statistical product typically consists of a relatively complex and integrated mixture of more or less repetitive operations and much less structured maintenance and development work. The repetitive operations are in principle possible to outsource, if there is – or could be created – a functioning market for the processes concerned. The development tasks are more difficult to specify in such a way that they can be the object of outsourcing contracts, and difficult to separate from the repetitive operations.

A major obstacle against outsourcing of core activities in statistics production is that more and more statistical products and production processes become strongly integrated and heavily

dependent upon each other. Common resources and infrastructures also tend to become more and more important. Different production systems will need to share the same data and metadata, and if these common resources are located in different organisations, resource sharing will be difficult to organise and will cause problems of responsibilities and security.

In summary, Statistics Denmark is an efficient and well functioning producer of official statistics. The major threat is that on-going budget cuts will lead to a situation, where there is no room for development work and necessary maintenance and renewal of investments in competence, expertise, and new solutions. If, on the other hand, Statistics Denmark could extend its methodological capacity in areas of importance for statistics production, this could give ample returns in the form of better and more efficient solutions to present and future challenges facing producers of official statistics.

Appendix on AKU and UH

We were asked to analyse two separate branches of statistics, the Labour Force Survey, *Arbejdskraftundersøgelsen (AKU)*, and the Foreign Trade Statistics, *Udenrikshandelen (UH),* in more detail. For this purpose considerable material has been compiled and sent to us. After some preliminary study, it became obvious for us that there are no special properties associated with these statistics contradicting the general conclusions already presented. In depth studies of these statistics would require more time than we have been given for the preparation of this report, and we are not convinced that spending resources on such studies would add much in addition to the benchmarking studies and systematic comparisons of these products that are carried out in EU countries, partly in parallel with our study. We have studied the preliminary results from these studies and comparisons and taken them into account in our evaluation.

Since products like the Labour Force Survey and the Foreign Trade Statistics are produced in all countries in roughly the same way and for more or less the same purposes, it is tempting to believe that the products are easy to compare by means of some key figures that indicate the quality and costs of them. However, when one makes comparisons on a low level of a statistical organisation, incidental circumstances may affect the comparison indicators in such a way that the results become confusing or even absurd. This usually leads to a lot of discussions and speculations, which are not always productive. It takes a lot of competent work to remove the variation caused by the incidental circumstances, before one may possibly make reasonably fair and meaningful comparisons. There is a long – and unfortunately rather disappointing – experience from trying to make these kinds of comparisons, which are often initiated by top-level managers, who, for obvious reasons, find this kind of seemingly simple benchmarking very attractive, but who may not be fully aware of all difficulties and pitfalls at the time when they launch the idea of a product comparison (they will be painfully aware of them later, when their staff have spent a lot of time and energy on them).

This does certainly not mean that benchmarking comparisons between concrete statistical products in different countries is a bad idea. On the contrary, as we have pointed out several times in this report, statistical offices can learn quite a lot from each other, exactly because they have so similar tasks. And the learning can take place on all levels and in all dimensions of the work of a statistical office: learning how to best produce a certain statistical product, how to best organise a certain process or function, how to organise the statistical office and the statistical system as a whole, etc. But in order to be effective, such learning must be firmly based upon insights about the tasks that are performed by a statistical office, and the different conditions under which these tasks have to be carried out in different environments. Such understanding does not come from studying a few simple, quantitative indicators. As we have just said these indicators may lead to interesting questions and analyses, but it is only after these analyses, which have to take a lot of time and intelligent work, that one may draw the right conclusions.

On these grounds, and because of the shortage of time available to us, we have limited our study of AKU and UH to brief descriptions followed by a few remarks.

The labour force survey (AKU)

The Danish *Arbejdskraftundersøgelsen* is a continuous survey for the population 15-74 years based on a rotating panel survey. Each week samples of equal size are interviewed, and results are published quarterly. The total number of individuals interviewed each quarter is 16,665 persons.

The samples are drawn from the Population Register and the Unemployment Register. The samples are stratified probability samples with a higher probability for unemployed in the age group 16-66 years.

Rotation is obtained by restricting the participation of each person to the quarter included and the following as well as in the quarter one year later.

In order to study the effects of non-response and to compensate for it as far as possible, a post-stratification scheme of 53 strata based on register data is used. A generalised regression model for using register data is being considered.

The interviews are mainly telephone interviews. Only those who cannot be contacted by telephone receive a mailed questionnaire.

About 10 full-time and 40 part-time people are engaged in the data collection. Other processes are taken care of by about 10 full-time people.

For estimating the accuracy of the labour force statistics, sampling errors are calculated for each quarter and non-sampling errors annually. The sampling errors are within the range which should be expected from the sample size and design applied. The non-sampling error measured is the non-response rate with an average around 30% . About half of the non-response were due to non-contact. Less than 10% of the sample refused interviews.

The *AKU* processing time from the start of data collection to the date of national publishing is approximately 5 ½ months.

AKU seems at present to give results of satisfactory quality [Danmarks Statistik 2001f]. The costs of the production are about what could be expected. The basic collection approach is at present by telephone. A main problem with this kind of surveys is the non-response. Investigations carried out show that, contrary to what might be expected, only small changes have been observed in the non-response rates during the last few years [Danmarks Statistik 2001e].

The methodology used in labour force surveys has been developing for many decades through a wide international co-operation, and will most likely continue to be refined. Statistics Denmark has so far managed to take advantage of the methodological development, but with reduced resources not permitting the staff to take part in the development, AKU may be one of the statistics, where Statistics Denmark may not manage to keep up with the methodological development.

Eurostat collects and compiles quality reports for LFS data from different countries. Such reports are available (in final or preliminary form) from Austria, Denmark, Finland, Ireland, Norway, and Sweden, and these countries have been selected by Statistics Denmark for a fast and informal overview of some key figures [Danmarks Statistik 2003g]. The overview is reproduced here as *Table 2*.

Land	**Stik-prøvestr.**	**LFS medarbejdere**	**Interviewere**	**Andre kommentarer**
Danmark	16.665 individer pr. kvartal	Ca. 10 i LFS sektionen	Ca. 40 deltids CATI inter-viewere	-
Finland	12.000 individer pr. måned	Ca. 20 i LFS sek-tionen samt ca. 5 medarbejdere med databehandling.	Ca. 150 inter-viewere	-
Holland	Ca. 8.000 husstande pr. måned	Ca. 12 i LFS sek-tionen. Derudover et ukendt antal database-medarbejdere	Ca. 500-600 face-to-face interviewere samt ca. 100 CATI interviewere	Har endnu ikke afleveret LFS kvalitetsrapport. Har Roterende panel med 5 bølger, hvoraf face-to-face i 1. bølge og CATI i efter-følgende bølger.
Irland	39.000 hus-stande pr. kvartal (dvs. ca. 110.000-120.000 individer pr. kvartal)	Ca. 20 i LFS sektionen (udvides juni 2003 til 30, da LFS kombineres med EU-SILC)	Ca. 130 interviewere (udvides juni 2003 til 152, da LFS kombineres med EU-SILC)	I forbindelse med EU-SILC udvides sektion og inter-viewerkorps, så de både varetager LFS og EU-SILC
Norge	Ca. 24.000 individer pr. kvartal.	Ca. 7 medarbejdere i kontoret er tilknyttet LFS. Derudover et mindre antal uden for kontoret.	Ca. 160 CATI interviewere	-
Sverige	Ca. 21.000 individer pr. måned	Ca. 18 i sektionen i Stockholm samt 3-4 feltarbejdere i Örebro	Ca. 150-160 CATI (i gen-nemsnit 90 CATI interviewere på LFS)	-
Østrig	33.100 hus-stande ved årlig under-søgelse	Ca. 10 i LFS sektionen	Ca. 1200 interviewere, som er organiseret lokalt.	Endnu ikke overgået til kontinuerlige under-søgelser. Formentlig overgår de fra og med næste år.

Table 2. Skønsmæssige sammenligninger af LFS i udvalgte lande.

The foreign trade statistics (UH)

UH reflects the monthly import and export for more than 10,000 different commodities from and to about 230 different countries. The statistics production is divided into

- *Intrastat,* which is the trade with countries in the European Union; and
- *Extrastat*, which covers the trade with other countries.

For *Intrastat* the statistics are based on reports from enterprises in Denmark trading with partners within EU, whereas *Extrastat* takes advantage of custom documents, which have to be completed in connection with imports and exports.

Even though foreign trade statistics have been prepared regularly for nearly 170 years, and international classifications have existed for a long time, a permanent problem has been to get the statistics from trading countries to match. The *Intrastat* based on recordings by individual traders within EU creates additional challenges.

Because of the long traditions in preparing these statistics, and thanks to well established classifications, the statistics from industrialised countries cover roughly the same commodity specifications. The main quality problem consists in the accuracy of measured quantities and values. Comparisons of trade statistics among countries have been performed ("mirror statistics"), and discrepancies indicate quality problems. It is not always possible to obtain a consensus about which of two alternative figures that is correct, if any. Danish foreign trade statistics seem to have a reputation for good quality on a stable level [Danmarks Statistik 2001g].

The National Bank of Belgium is right now in the process of carrying out a benchmarking study of foreign trade statistic in a number of European countries, among them Denmark. We have been given access to some preliminary results from this study. A summary of the results is given in *Table 3*.

The table confirms some observations that we have already made on a general level in this report. For example, Statistics Denmark has a relatively low percentage of staff with a university degree. Statistics Denmark also has a relatively small number of people who are ensuring quality. As for the number of time series available on the Internet, the figure is missing in the table, but according to information that we have obtained from other sources, there are at least 27,500,000 time series available from the Internet-based Statbank Denmark (Statistikbanken), which we have mentioned earlier in this report.[25]

However, we do not want to give too much value to the figures in *Table 3* or other figures from the same report. Many figures look very strange indeed, and this illustrates very well what we have said in the introduction to this section of the report: it is extremely difficult, and requires a lot of time and expertise, to make fair and meaningful comparisons on such a low level as individual statistical products.

[25] Incidentally we have also noted that the number of time series available on the Internet reported for Sweden (20,000) is completely wrong. A more correct figure is 167,866,922.

	Belgium	The Nether-lands	Portugal	Denmark	Austria	Sweden	*Average*
number of staff	89.3[1]	89	50	37	73	30	*61.4*
university degree	5[2]	13	12	6	1	14	*8.5*
non-university higher education degree	27	9	0	23	13	13	*14.2*
% of electronic declarations	65	99	55	85	97	36	*72.8*
workload (# declarations / # staff)	4315	2440	4536	4581	3657	7366	*4483*
number of statistics produced	23	9	16	6	18	17	*14.8*
number of charts issued	240	na	62	158	55	136	*130.2*
number of time series on the internet	4,150,000	574,437	140	na	11	20,000	*948,917.6*
timeliness of the publications (average # days late)[3]	-0.6	4	-4.4	4.8	35.6	30.2	*11.6*
number of persons employed for ensuring quality	66.9	73	46	31	44.4	22	*47.2*

Table 3. Summary of the results of a benchmarking study of foreign trade statistics in a number of European countries. From [National Bank of Belgium, 2003].

When we have looked at this preliminary benchmarking report and other material that we have obtained and followed up our observations and questions with interview at Statistics Denmark, we have not been able to establish any unexplainable facts that contradict the conclusions that we have come to in the general parts of this. And we are convinced that these conclusions for Statistics Denmark as a whole are in fact more reliable and also more useful as a basis for judging the total efficiency of Statistics Denmark and for proposing what to do in order to further improve this efficiency.

On the other hand, we certainly recommend Statistics Denmark and other statistical offices, including Eurostat and other international organisations to continue with benchmarking efforts *both* regarding functions and processes *and* regarding individual statistical products. However, the main value of the latter is that they lead to a lot of questions concerning apparent contradictions and absurdities. Many of the differences between offices can usually be explained by different circumstances that do not have to do with the efficiency, but after these issues have been removed from the discussion, some issues are likely to remain, where some countries have actually found better solutions than others, and where countries can learn from each other in a very effective way.

Another conclusion from studying foreign trade statistics is that this is an area which becomes more and more important in our era of increasing global trade. On the other hand, the growing role of multi-national companies, the growing complexity of production systems, and the increasing sophistication in the division of labour and tasks between companies and between countries, inevitably lead to increasing difficulties in measuring different kinds of flows, e.g. the flows of trade between countries. Here again, as so many times earlier in this report, we see a need for producers of statistics to be methodologically alert and innovative, and unfortunately this requires more rather than less resources. To some extent, however, this need for increased resources can be compensated by the rationalisation effects of more extensive use of new techniques such as the Internet and still not fully exploited possibilities to generate statistical data as by-products from other processes in modern societies.

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