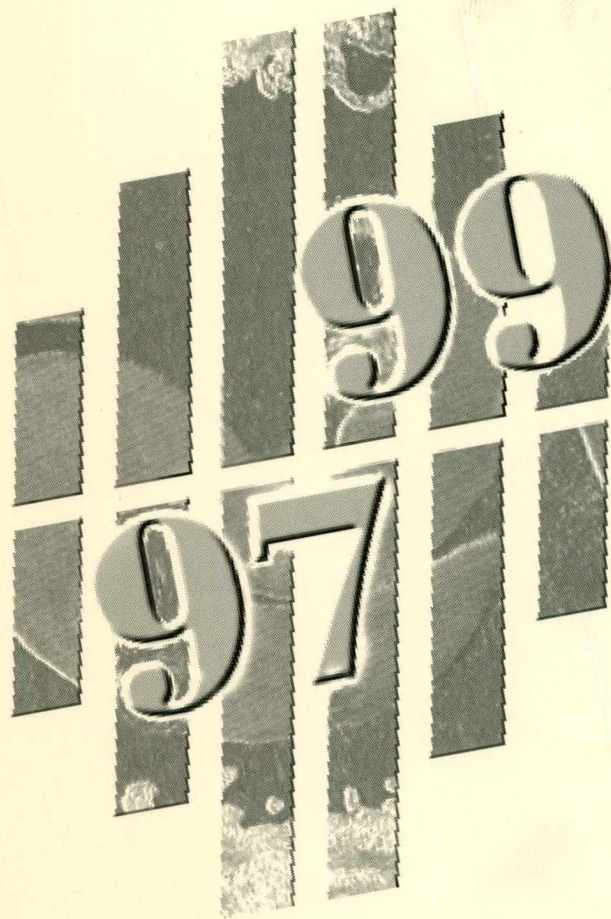


**KATSAUKSIA**

**STATISTICS FINLAND:  
MAIN LINES OF RESEARCH AND  
DEVELOPMENT IN 1997-1999**



Statistics Finland

REVIEWS 1997/6

**Statistics Finland:  
Main Lines of Research and  
Development in 1997–1999**



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## Preface

The role of research and development in improving the quality of statistics and statistics production has attracted growing attention in recent years at many national statistical agencies, in international journals and elsewhere. The increasing importance of R&D in supporting statistics production has also been emphasised at Statistics Finland. Statistics Finland's first research programme was published in 1994. This, the second programme covers the period from 1997 to 1999. Building on the good reception and success of the first programme, this Document aims to provide a more detailed description of the areas on which the agency shall focus its research efforts over the next three years. At the same time, the aim is to try and find the right niche for the agency on the domestic and international research scene; to clarify the agency's research profile and division of labour; to promote cooperation and networking with other research organisations; and to find new ways of doing and funding research.

This Document outlines the main lines of research and development that shall be pursued at Statistics Finland during 1997–1999. In other words, it provides a broad framework within which more detailed plans for specific research projects can be discussed as part of the agency's ordinary financial and operational planning.

The principles, strategies and concrete measures set out in this Document are aimed at maintaining high levels of research innovation and productivity at Statistics Finland. Scientific research supports the pri-

mary goal of statistics production: to provide up-to-date, reliable and high-quality statistics which meet the growing information needs of modern society. In addition to its concern with quality, research and development aims to improve the cost-effectiveness of statistics production and to promote critical but constructive debate on statistics production. Assuming that these issues have more generally importance, Statistics Finland wishes to make its experiences available – in the form of this Document – on the international scene as well.

In 1999, Helsinki will be hosting the 52nd scientific session of the International Statistical Institute. Delegates are expected from all over the world, representing a wide range of statistical specialisms. As well as playing a major part in organising this conference, Statistics Finland is preparing to make substantial contribution to the scientific programme. The development of our research effort is crucial to attaining this objective.

The work to revise this research programme was coordinated by Statistics Finland's Scientific Advisory Board. Many outside experts were also consulted. The Document was compiled by Risto Lehtonen, Director of Research, and Timo Byckling, Secretary to the Scientific Advisory Board.

Research and other staff at Statistics Finland have been widely consulted in the preparation of this Document, which has been extensively discussed and reviewed before publication. I wish to thank all those people who have contributed to this project.

**Timo Relander**  
Director General

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## Summary

In recent years Statistics Finland has begun to attach greater importance to research and development. Research can have a particularly significant role in supporting statistics production and in improving the quality of statistics and production processes. Research is also recognised as an important strategic tool in building up the agency's information assets. The same trend is evident in many other countries as well, in the European Union, in Eurostat and in several national statistical offices around the world.

The main purpose of Statistics Finland's first research programme for 1994–1996 was to create and establish the necessary infrastructure for research work at the agency. Many of the targets set out in that programme have been attained. Among the most important objectives for the next three years are to define more accurately the objects of research, to find new ways of organising and funding research, and to integrate research more closely with statistics production.

This Document brings together for the first time all the different lines of research pursued at Statistics Finland: *research with a social sciences orientation*, *research with an economics orientation* and *statistical and other methods research*. Given this broad overview, it should be possible more easily to select appropriate research subjects according to current needs and resources available.

The focal areas of research have been defined on the basis of the agency's current strengths in research as well as its current development needs. *Research with a social sciences orientation* will focus on the study of living conditions and welfare, the labour mar-

ket and changes in working life, consumption and consumer attitudes, environmental and energy issues as well as demographic research. In *research with an economics orientation*, focal areas of study include industrial economics, environmental economics, regional economics and methods research, the latter including the development of the national accounts system and economic indices and indicators. Some areas of research will need to be tackled with a combination of different methods and approaches; examples are provided by *information society* and *trends of globalisation*.

The key research area for Statistics Finland, however, is *statistical and other methods research*. This line of inquiry consists of statistical R&D and related scientific research as well as other methods research. Statistical R&D concentrates on the methodology of survey research and register-based statistics production and on research into statistical data processing, statistical data disclosure methods and the methodology of international comparisons. Other methods research related to statistical R&D cover studies of classification methods, information technology and quality issues.

Given the limited research resources available at Statistics Finland, it makes sense to work closely with university researchers and research projects. Networking with universities and research institutes both at home and abroad is a good way of further strengthening those areas of research in which we have a high level of expertise and which can contribute most to the further development of production processes and services.

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Examples of networking are provided by the agreement signed in October 1996 with the University of Jyväskylä on the further development of cooperation, and by the application of new demographic methods together with the University of Joensuu. The agreement between Statistics Finland and the University of Jyväskylä comprises training for statistical experts, statistical R&D and a joint research project (*Research Project for Social and Business Survey Methods*). There is a similar arrangement with the University of Helsinki Department of Sociology, who are running a doctoral programme called *Population, health and living conditions*.

In order to promote a stronger orientation to research, Statistics Finland shall provide further and supplementary training to staff members. Natural staff turnover offers a useful way of raising the level of scientific expertise in the agency. The agency must have a sufficiently large and competent research staff. Recruitment of outside experts on a temporary basis can help to speed up the creation of the necessary critical mass.

Applications for research funding shall be directed increasingly to outside sources, both domestic and international (and particularly the European Union). Important outside sources of funding for research work aimed at the completion of post-graduate degrees include the Academy of Finland and various foundations.

This Document broadly identifies the focal areas of Statistics Finland's research work in 1997–1999. Final decisions on resource allocation for individual research projects and further education shall be made separately each year.

Cooperation in research and development issues at European and international level is of growing importance. Key areas of work in this regard are the agency's contribution to the preparation of *The Fifth Framework Programme for Research and Development on the European Statistical System* (1998–2002) and the agency's scientific contribution to the *52nd Session of the International Statistical Institute* in Helsinki in 1999.

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# I. Introduction: The Role of Research

## Research at a Statistical Agency

The society around is increasingly complex, making it more and more difficult for anyone to predict future trends in development. This presents a major challenge for statistical agencies. One of the basic requirements is for statistical agencies to have the flexibility to respond to both current phenomena and longer-term statistical needs. As the clientele of statistical agencies continues to grow and expand, new demands are being imposed upon the products and services offered. Increasingly, the demand today is for tailored, analytical statistics and for information that can help customers resolve their problems. Rather than fragmented pieces of information, customers today expect statistical agencies to provide coherent, well-organised information and interpretations that can help them forecast trends in development. A powerful tool for an effective response to all these challenges is provided by scientific research and development: in the future R&D and scientific expertise will play a much stronger supportive role in the development of statistical products.

The aim of research and development at Statistics Finland is to promote and support the production of high-quality, up-to-date and relevant statistical information for citizens, business companies and other organisations in an easily accessible and understandable format. Research plays an important role in helping to describe, explain, understand and possibly predict social and economic change, generating new concepts and frames of interpretation. It also has a crucial part to play in ongoing efforts to fur-

ther improve production processes, to raise the quality standards of statistics production and to cut costs through the introduction of new methods. New innovations inspired by research may help to create new products and services and improve existing ones. To achieve all this, research must have a sound scientific and methodological basis and, importantly, it must be closely integrated into statistics production.

In its research work Statistics Finland shall concentrate on those areas that serve the agency's immediate development needs in statistics production (applied research, development work; see Appendix 1). Other areas high on the research agenda are those that can help to provide a better knowledge and understanding of the social phenomena under study as well as a more robust methodological foundation for research work; and those that can contribute to a better appreciation of the work that is done by Statistics Finland at home and abroad (applied research, basic research; see Appendix 1). For this reason research projects conducted or sponsored by the agency should comprise not only work that is directly relevant to production processes and their development, but also research which has longer-term or more general benefits to the agency.

Statistics Finland has made clear its commitment to invest more heavily in research and development. In its budget and action plan for 1997–1999 Statistics Finland pledges itself to strengthen the role of research in increasing the agency's information assets and in implementing the action strategies adopted. It is expected that research will play an increasingly important supportive role in statistics production as



well as in the quality assurance of statistical products. Specifically, the targets set for the three-year period are as follows:

- the focal areas of research, methods of research and support systems have been established throughout the agency;
- an active and effective network of cooperation with universities and research institutes has been established;
- the number of research staff with appropriate scientific qualifications work has increased;
- research has been closely integrated into the development and quality management of statistical production processes; and
- the Current Best Methods (CBM) have been widely adopted throughout different production processes.

For an interested reader a brief summary of the Finnish system of official statistics as well as the functions and organisation of Statistics Finland can be found in Appendix 2.

### **Research Programme for 1994–1996 and Development Objectives**

**Research programme for 1994–1996.** Statistics Finland has a long and impressive research record, particularly in the field of economic research. During the 1970s the agency's research work was brought to a virtual standstill following a major internal overhaul in 1971. Since the mid-1980s, however, there has been a growing recognition of the role of research as a crucial quality component in statistics production. A task force set up to explore new avenues for the development of research at Statistics Finland published its report in 1986. Many of

the reforms proposed by the task force have been put into effect, including the institution of a Statistical Methods Unit and a position of Director of Research, establishing closer links of cooperation with universities and launching a series of scientific reports. However, other steps were also needed in research to raise the quality of statistics and production processes. A Scientific Advisory Board was appointed in 1993 to put together a research agenda for the agency. Statistics Finland's first ever research programme for 1994–1996 was compiled by this Board.

The aim of this programme was to outline a feasible plan and to list the specific means for stepping up the agency's research efforts within a reasonably short time scale. It was felt that there were certain strengths and assets that would help the agency to attain the objectives set out, including a good infrastructure for doing research work, scientific task forces representing a high level of research expertise to support the agency's various statistical units, reasonably close links of cooperation with universities and research institutes, a competent and committed staff, and a further and supplementary training system which the right basic orientation.

Many of the proposals set out in the 1994–1996 programme to further strengthen the research infrastructure have been put into effect. For example, a new Statistical R&D Unit, upgraded and expanded from the former Methods Unit, was inaugurated on 1 October 1996. In addition to the Director of Research, other experts in statistical methodology have been invited to work at the agency under short-term fellowship arrangements. A number of agency researchers have been involved in joint projects with university scholars. Research results have

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been reported in scientific journals and in Statistics Finland's own scientific Research Reports series and presented at international conferences.

During the period under review two doctoral and five licentiate's theses were completed at Statistics Finland. Several people working on their theses have received support on an annual basis to help them complete their studies. Ongoing research projects have been introduced and evaluated at scientific seminars hosted by Statistics Finland, often with outside experts taking part. Survey data sets collected by Statistics Finland have been made available to numerous outside researchers, some of whom have worked in office space provided at the agency. Major steps have also been taken during 1994–1996 to promote a more positive atmosphere for research work at the agency.

**Main lines of research and development in 1997–1999.** A central concern in the further development of Statistics Finland's research effort over the next three years is to define the main lines of inquiry for scientific research. At the same time, the aim is to find the right niche

for the research work that is done at the agency in relation to the work that is done elsewhere in Finland, within the EU and other countries. Apart from defining the focal areas or main lines of research, ongoing concerns include resource allocation, forms of research implementation, support and funding and the closer coordination of research and statistics production.

As well as doing independent research, the agency will seek to establish closer links of cooperation with university researchers and research projects. Networking is a sensible strategy for a statistical agency with limited research resources. It can also help to promote those areas of research in which Statistics Finland has the strongest expertise and in which it can expect to gain the greatest benefits with regard to the development of statistics production.

This Document broadly identifies the focal areas of Statistics Finland's research work in 1997–1999. Final decisions on resource allocation for individual research projects and further education shall be made separately each year.

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## 2. Focal Areas of Research

### Basic Classification of Research

A basic distinction is made between *research for the development of statistics on social and economic phenomena* (substance matter research) and *statistical and other methods research* for the development of production methods (methods research). The basis for this distinction is quite plain and straightforward: particularly in new areas with important implications for society at large, the development of statistics production requires a more thorough knowledge of the phenomena on which the statistics are to be compiled. The best and most sensible way to collect the necessary information is to apply the approaches, concept apparatuses and methods of social and behavioural sciences and economics.

On the other hand, statistical and other methods research serves many different areas of statistics production and empirical research. An important practical objective is to make the Current Best Methods (CBM) available for production processes and research projects.

The focus on socially important issues and areas, on new areas of statistics production and on methods research will help researchers at Statistics Finland to gain a fuller knowledge and understanding of the object of official statistics and to develop information systems that meet society's changing information needs.

The definition of the focal areas of *research into social and economic phenomena* is based on assessments of the agency's current strengths in research and its research development needs. Moreover, the

focal areas identified have been selected with a view to making the best possible use of the agency's position as a major producer of basic data for research purposes and the expertise achieved in that activity.

*Research with a social sciences orientation* shall focus on:

- living conditions and welfare;
- the labour market and changes in working life;
- consumption and consumer attitudes; and
- environmental and energy issues.

*Demographic research* with a social sciences orientation is needed in order to gain a deeper understanding of the dynamics of demographic phenomena. It also helps to provide a more solid basis for the introduction of new, up-to-date methods for population projections.

*Research with an economics orientation* shall focus on:

- industrial economics;
- environmental economics;
- regional economics; and
- the economic and other effects of information society.

*Statistical and other methods research* comprises statistical R&D and related statistical research work. It also comprises other methods and methodologically-oriented research, which is mainly carried out in connection with research into social and economic phenomena. Focal concerns for *statistical R&D* include:

- the statistical methodology of survey research and the methodology of register-based statistics production;
- statistical data processing;
- statistical data disclosure methods; and
- the methodology of international comparisons.

*Other methods research* related to statistical R&D comprises studies of:

- classification methods;
- information technology; and
- quality management.

*Methodologically-oriented research into social and economic phenomena* is chiefly concerned (in the field of social sciences research) with the development of methods for collecting survey data and (in the field of economics research) with the development of indices and indicators.

In some of the focal research areas introduced below there has already been significant research activity, others are new, emerging areas. In each case brief mention is made of the most important ongoing or proposed research projects.

Research into social and economic phenomena and statistical and other methods research are discussed separately even though in practice they are closely related.

## Research into Social and Economic Phenomena

**Research with a social sciences orientation.** Following is a list of some of the most important areas of research into social phenomena. A basic requirement for the production of relevant social statistics is a thorough knowledge and understanding of the

areas concerned. This is the broad framework on the basis of which decisions will be made each year on resource allocation to individual research projects:

**a) *Living conditions and welfare.*** Statistics Finland has traditionally played an important role in describing and monitoring the population's living conditions. The material collected for the *Living Conditions Survey* in 1994 has been widely used by researchers. Cooperation with universities in this field will continue for many years to come. It is important to have several different indicators to follow how the recession of the early 1990s is reflected in Finnish welfare and its underlying factors. One way to do this is to carry out measurements at regular intervals of living conditions, income, wealth and consumption.

During the three-year period covered by this programme there are plans to launch a new *Wealth and Property Survey*. This, combined with earlier materials, will provide a useful source of information for monitoring changes in economic inequality between population groups. The data collected for the *Time Use Survey* during the period covered by this programme will provide a unique opportunity for researchers in many different disciplines to explore such areas as the value of house work, informal work, equality, transport, culture and leisure activities, sport, the rural-urban dimension, etc.

The basic data for the *Income Distribution Statistics* offer a solid foundation for monitoring and analysing trends in the financial status of different population groups both from a cross-sectional point of view and in a panel design. The so-called service data sets formed out of the basic data are an important tool both for research and for political decision-making concerning income dis-

tribution. During the programme period Statistics Finland will seek to improve the usability of this extensive data set for other research purposes as well.

Other subjects of study under the heading of living conditions and welfare are *safety and victim studies, culture consumption, leisure lifestyles and mass media consumption*.

In many other European countries and statistical agencies trends in the development of living conditions have been described and evaluated in so-called *social reports*. Statistics Finland shall give serious consideration to the need for such reports and if necessary increase its investment in this line of research.

There is a growing need today for reliable, comparative data on living conditions in different countries (particularly within the context of the EU). The *European Community Household Panel* (ECHP) provides an excellent opportunity for international comparisons of living conditions (more on ECHP later). Statistics Finland has played a significant role in the planning of the EU's *Time Use Survey*, offering valuable experiences from its own studies in Finland.

Statistics Finland has access to extensive sample- and register-based data sets describing the population's living conditions and welfare. The *longitudinal data sets of population censuses* offer unique material for studying such aspects as living conditions in childhood and the subsequent development of health status and well-being. As well as increasing our own research effort in this field, steps must be taken to make these data sets more readily accessible to researchers outside the agency as well. One way to do this is to encourage closer networking as well as joint projects between Statistics Finland and

researchers working at universities and research institutes.

**b) The labour market and changes in working life.** Questions related to the labour force, labour relations, the labour market and unemployment, i.e. the concept of labour in its various contexts, constitute an important social policy issue which requires continuous research attention. The indications are that the ongoing changes in the labour market are set to continue for a long time. The present trend towards short-term employment contracts and the ever stricter division of the labour market between two groups of people, the excluded and the privileged, are bound to spill over into major upheavals in society. Among the broader subjects that are shared in common by several areas of statistical research are the redistribution of work, new arrangements for working hours, changes in qualification requirements and in the occupational structure as well as training and the demands of working life.

Another aspect covered is the ongoing change in working conditions. A series of studies covering the entire wage-earning population, known as the *Quality of Work Life Surveys*, provides, once the 1997 survey has been completed, materials for describing changes in working conditions and experiences of working conditions over a period of two decades. The *Quality of Work Life Surveys* meet the changing information needs for statistics compiled on different aspects of work. Specific themes high on the current research agenda include:

- the development of information technology at work;
- gender equality;
- changes in work organisation;

- 
- the links between labour market status and working conditions; and
  - international comparisons of working conditions.

Earlier data sets from the *Quality of Work Life Surveys* have been widely used for research purposes. The series of studies has been planned and designed in close collaboration with universities and research institutes.

The *Time Use Survey* sheds light on the changes in working life following from the ever wider introduction of flexitime and individual working hours. The problems of unemployment, marginalisation, urban poverty etc. are key areas of study in EU social research. One of the aspects on which Statistics Finland has produced much research material is that of gender equality in the world of work.

Statistics Finland's data resources are also used in a major *international research project on labour flows*. The register-based material is complemented with interview data from companies on organisational changes and on their effects on the workforce. Statistics Finland is uniquely placed to link different sources of data in this way, and there is every possibility to apply the model more widely.

### **c) Consumption and consumer attitudes.**

Statistics Finland's annual *Consumption Survey* (formerly known as the Household Budget Survey) primarily serves the needs of the consumer price index. However, it also offers a useful basis for consumption studies in different disciplines. The material collected shall be used not only in the agency's own work but also offered to universities and research institutes.

Given the rapid pace of change in modern society, there is a constant demand for continuous measurement of consumer attitudes and expectations. Consumer decisions and expectations are increasingly critical market determinants, and consumer and environmental policy is assuming ever greater importance alongside traditional social policy thinking. Key emerging issues include the relationship and interface between the *Living Conditions Survey* and the *Consumption Survey* as well as the meanings of consumption to end-users. The consumption perspective is also crucial to the studies of culture and leisure pursuits and to the *Time Use Survey*.

As far as consumer policy and product culture are concerned, the trend today is towards environmentally sustainable production aimed at the conservation of the world's natural resources. This requires research into consumption habits and lifestyles as well as consumer attitudes. More information is needed to monitor changes in society and to predict future trends, to inform social policy debate and to develop mechanisms of social steering in such fields as welfare, consumer, environmental and energy policy. In addition to traditional consumption research, Statistics Finland has also had close cooperation with universities in researching *environmental attitudes* and *energy consumption*. Closely related to this, research on information society has also explored the *use of new technology, particularly information technology*.

### **d) Environmental and energy issues.**

Analysis of the ecological and social implications of energy consumption requires an interdisciplinary approach which also looks at future trends in development. Statistics Finland is well placed to satisfy the growing in-

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formation needs in this area. Ongoing research projects include those on:

- different aspects of household energy consumption and future consumption scenarios in view of the ongoing structural changes in households;
- the application of both quantitative and qualitative research methods in studying ways in which households are consuming energy and trying to save energy; and
- measurements of public opinion and awareness about the environment and environmental policy.

There is also ongoing research at the agency into environmental economics. Core issues in this field include the measurement of the ecological quality of forests and environmental expenditure in business companies as well as analysis of the interplay between the economy and the environment. Closer cooperation between environmental research with a social sciences orientation and environmental economics should help to find useful new perspectives and solutions for both lines of inquiry.

**e) Demographic research.** The object proper of demographic research, i.e. society and its people, is in continuous flux. The main purpose of demographic research is to provide an up-to-date description of the demographic structure of society and how it is changing.

In addition to traditional population statistics, Statistics Finland also produces population prognoses and compiles new life expectancy tables each year. The agency has also done demographic research on migration, fertility and mortality. In this area the agency has close cooperation particularly with re-

searchers from the University of Helsinki Department of Sociology.

Given the important role that Statistics Finland plays not only in the production of statistical data but in the use of register sources, the agency is certainly an attractive proposition for outside researchers and research institutes as a partner in cooperation. Special attention must now be paid to the use of the latest demographic methods in compiling population prognoses and in assessing the reliability of those prognoses. Research in this field is currently carried out in cooperation with the University of Joensuu Department of Statistics.

**f) Development of interview and questionnaire methods.** Research can contribute to the development of survey methodology in a number of different areas. These include methods of (computerised) data collection such as CATI (Computer Assisted Telephone Interviewing) and CAPI (Computer Assisted Personal Interviewing), procedures for pretesting questionnaire items, other evaluation methods and survey integration.

To improve the quality of data collected in interviews and questionnaires, the first requirement is to give closer attention to advance planning in the pilot survey phase. In addition to using the traditional questionnaire testing procedure, recently developed cognitive methods can be fruitfully used to analyse the response process. This will provide a more solid foundation for the development of data collection processes in statistical units, for the improvement of questionnaires and for testing special items that have been used previously. The system of testing questions which focuses on the response process and on the interaction situation provides the

basis for improving the quality of measurement. During 1997–1999 the existing pre-testing methods shall be evaluated and adapted to the needs of Statistics Finland.

The aim of *survey integration* is to make sure that the classifications and concepts used in research and their operationalisation are continually updated so that they comply with the discipline's current standards and practices. As regards the development of data collection methods, it will be necessary also to look at coverage levels in telephone interviews and related factors, the effects of changes in coverage levels on data collection methods and more broadly at nonresponse.

**g) International research cooperation.**

Finland's membership of the European Union has presented Statistics Finland with new obligations to satisfy the Community's information needs. On the other hand, membership also provides the agency with an opportunity to join some interesting new projects. The *European Community Household Panel* (ECHP) is one example of a new, major social indicator project which serves the Community's social policy planning and monitoring needs in the fields of income distribution, demography, labour market, health, education, housing, migration and other sectors of society. For reasons of co-ordination the focal areas of research need to be harmonised, but on the other hand there is sufficient latitude for individual countries to adapt the items according to their own systems and circumstances.

*Comparative international survey research* is increasing. With the continuing growth of international research cooperation, more R&D work will need to be done in the methodology of international compari-

sons. More on this in connection with the discussion on statistical methods research.

**Research with an economics orientation.**

With the changes that are continuing to sweep society and the growing information needs of clients, there is mounting pressure to improve and develop economic statistics. The research effort on economic phenomena concentrates on those areas in which there are close links of cooperation with other research organisations, or in which such links are being established. Increasingly, economics research is carried out in the context of joint projects. For these projects to work successfully, Statistics Finland must make a sufficient research input of its own. Focal areas of economics research include:

**a) Industrial economics.** Industrial economics includes *demographic enterprise research, research into enterprise subsidies, cluster research and micro-economic analysis of productivity and employment*. Another area of industrial economics is *technology research* (under science and technology statistics). One of the key areas of research on industrial economics is represented by long-term empirical research at the business unit or enterprise level. This also applies to other research at the statistical unit level, such as municipality research based on coherent data sets.

*Technology studies* have recently emerged as a significant area of economics research. The main concerns of technology research may be divided into three categories: research into R&D, innovation and patents.

Key areas of *research into R&D* include the productivity effects of R&D, assessment



of the effects of R&D subsidies, and the relationships between profitability, research and human resources (training, staff structure).

As regards *research into innovation*, key interests include the relationship between product and production process innovations and business profitability, the characteristics of innovative businesses as well as factors promoting and prohibiting innovation. Topical issues in *research on patenting* include company patenting behaviour, the characteristics of firms with a high level of patenting activity and the relationship between patenting and business profitability. Close cooperation with organisations and researchers at home and abroad is crucially important with regard to the continued success of technology research.

Examples of research in industrial economics include a project on productivity trends in the manufacturing industries, based on enterprise-level data. This project is also concerned to evaluate the quality of the industrial statistics used in the project. There are also plans to carry out a research project on the impacts of information technology and workforce knowhow on productivity in manufacturing industries and on the creation of new jobs.

A research and development project concerned with the measurement of productivity in the public sector proceeds from the micro level to the macro level. The measurement of productivity trends in local government makes use of existing statistical sources; the applicability of these data for this purpose is also evaluated. Productivity calculations concerning the municipal sector shall later be expanded to comprise federations of municipalities.

Most of the projects mentioned above shall be entirely or partly funded by monies from external sources.

**b) Environmental economics.** Statistics Finland is a major producer of information on the interaction between the environment and the economy. The aim of the agency's ongoing environmental accounting project is to develop a system that will combine both economic and environmental values. The System of Integrated Environmental and Economic Accounts (SEEA) represents an extension to the national accounts recommendation SNA93/ESA95 covering natural resources and the environmental impacts of industrial production. The national accounts parameters and indicators provide a measure of how well the policy of sustainable development is being implemented.

R&D in the field of environmental economics at Statistics Finland comprises scientific research aimed at generating new solutions as well as the analytical application of existing solutions. The adaptation of the international environmental accounting system (SEEA and ESEA, which is under preparation) for use in Finland requires research into its theoretical premises, the quality of natural resources and the environment, environmental indicators and the pricing of environmental resources. Research in these areas must be continued and intensified.

Statistics Finland has been engaged in projects concerned with the measurement of the ecological quality of forests, the substance and methods of natural resource accounting and the measurement of sustainable development. The results have also been used in international development projects. Focal concerns for research in environmental economics over the next few years will include different methods of valuing environmental resources, the values produced by those resources and their economic significance. In the development of

basic indicators for describing environmental changes, potential research partners should be found in the field of environmental and energy research (whether oriented to the social sciences or natural sciences). This applies, for instance, to research into willingness to pay pricing methods based on interview studies.

**c) Regional economics.** The significance of the regional dimension in social statistics has increased considerably since Finland joined the European Union. An important aspect of the intensification of regional research at Statistics Finland will be the agency's involvement in joint projects as well as its closer cooperation with universities and regional research institutes. At the same time, work will be stepped up to develop information systems for the description of regional economies as well as methods to support regional research. Statistics Finland will be hosting a Nordic seminar on regional economics in 1998. In the run-up to this seminar we will need to see a stronger research input in the field of regional economics.

Statistics Finland has been involved in a *research project concerned with the regional effects of the public economy*. The aim has been to apply a model based on the theory of equilibrium to analyse the regional effects of the public sector. Statistics Finland has been centrally involved in the development of this model.

Analysis of the *structure of regional economies and the interaction between regional economies* is an important ongoing project in regional research. Input-output analysis is a significant component of the project: regional input-output tables make it possible for researchers to adopt a new approach to stu-

dyng the structures and effects of regional economies. A major joint project is under way in this area, involving among others the University of Oulu and the City of Helsinki Information Centre.

Finland's membership of the European Union has given added urgency to the need for new and better methods of measuring and collecting information on regional development: these are needed for the preparation of EU regional development programmes and for the evaluation of those programmes. Importantly, a new indicator system is needed for the description of regional economic and community structures as well as regional development. Tools are also needed so that changes in regional development can be monitored more quickly. Research will play a crucial part in developing the contents and the production of rapid-response indicators of (cyclical) regional development; for instance, the accuracy of indicators must be improved, and sample-based data sets need to be complemented with register data.

**d) Information society and its economic effects.** Research for statistics on information society has three main concerns: to better understand the changes going on in society, to better understand the technical, economic and social conditions and consequences of those changes, and to provide relevant and up-to-date descriptions of those conditions and consequences. Subjects of current interest include the impacts of information technology on production, employment and time use. Other areas covered are the changes in the labour market as well as employment in general. Economically-oriented research needs to address such issues as the role of information industry in the national economy and the net-

working, clustering and globalisation of companies. This new area of research is related to industrial economics, but it needs to be mentioned separately because there exist no data sets at the statistical unit level for the analysis of the effects of information society. Apart from the shortage of concrete evidence, the main difficulty is that the information is so scattered.

**e) Methods-oriented economics research.** Methods-oriented economics research provides the tools that are needed for the description of society and changes in society. This area of research comprises the development of national accounts and environmental accounts systems, the measurement of the value of domestic work, micro-macro links and the development of different kinds of indices and indicators. Indicators and standardised frames of description are needed chiefly for purposes of economic, social and environmental policy planning and for international comparisons.

Fixed-price calculations based on different kinds of descriptive, hedonic or economic index methods are an important development priority over the next few years and will require a significant research input. Focal research areas include the real estate market, the measurement of inflation and the labour market. As part of an EU harmonisation project, research shall be undertaken to study the effects and processing of quality change in the consumer price index. Methodological problems that these research areas share in common shall be tackled by a method based on hedonic regression. Several research projects are currently under way or in preparation in this area, involving both international cooperation and post-graduate studies. The projects will be carried out

jointly with universities, research institutes and other organisations, some with funding from the EU.

In the field of *labour market research* work is under way to establish the feasibility of an index to describe trends in labour costs. The index will be incorporated into wages and salaries statistics. The feasibility studies are looking at whether and how existing sources can be utilised and at how the quality and quantity of labour input can be standardised for the index (both as a theoretical and practical problem).

**Other research into social and economic phenomena.** To make sure that its information systems keep abreast of the accelerating pace of change in society, Statistics Finland must continually respond to the new research challenges that are thrown up with that development. Two noteworthy examples of such challenges are the *social implications of information society* and the *trends of globalisation*. All research efforts, whether social-scientific, economic, or interdisciplinary, shall be carried out in cooperation with universities and research institutes. Experts working in different statistical units at Statistics Finland must work closely with each other to make sure that these joint projects are successful.

### Statistical and Other Methods Research

Statistical methods research is concerned primarily with the development of statistical methodologies for better statistics production. The practical goal of statistical methods research is to produce up-to-date, scientifically valid methodological solutions, or the

Current Best Methods (CBM) for statistics production and for empirical research purposes. The attainment of this goal will require a long-term research and development effort, including applied and basic research in statistics. Most of this work is carried out in the Statistical R&D Unit in cooperation with university departments of statistics as well as with the statistical units of the agency.

Statistical R&D is a high priority within the EU, Eurostat and national statistical agencies. This is clearly evident in the EU's extensive R&D programmes (DOSES 1989–93 and DOSIS 1994–).

**Statistical R&D.** Focal concerns for statistical R&D and related methodological research include the following:

**a) *Statistical methodology of survey research and the methodology of register-based statistics production.*** The development of survey methods is an important priority because many continuous and expensive production processes are based on sample surveys. Research into the methodology of register-based statistics production is a new area which is rapidly gaining in significance now that the majority of statistics are based on data obtained from administrative registers.

The purpose of research on survey methods and the methodology of register-based statistics production is to develop and introduce statistical methods that are cost-effective and that can help to improve the reliability of estimates. These methods are needed in various areas of social and economic statistics and empirical research. Statistics Finland has strong research traditions in this field. Research is currently carried out

in cooperation with the University of Jyväskylä Department of Statistics, with which Statistics Finland has worked closely for a number of years. There is also international cooperation in this field, most notably with the University of Montreal.

The focal concerns of *research on survey methods* are with the research and sampling designs needed in sample-based statistics production and empirical research, methods of data collection, estimation, and analysis as well as statistical quality control. Many sample-based statistics and research projects require complex research and sampling designs which include a longitudinal design as well as multi-stage sampling. Complex designs of this kind are becoming increasingly common. Therefore, important areas for methodological research include the *development of panel and rotation designs and sampling designs for complex surveys as well as statistical estimation and analysis methods for these surveys*. Other areas of research include methods of assessing and adjusting errors due to nonresponse and frame problems as well as measurement errors.

Statisticians and researchers using survey methods resort increasingly to register-based auxiliary information in order to improve the accuracy and efficiency of their estimations. For this reason an important concern in statistical methods research is to develop *the methods of using register-based and other auxiliary information in survey sampling and estimation*. At the same time empirical and simulation studies are needed to analyse the statistical properties of estimators and their variance estimators.

Other important areas of research and development in statistical analysis methodology include *model-based and design-based statistical multivariate methods and models*. A

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new area is represented by so-called multilevel models and generalized linear mixed models, which can be used in regional estimations, for instance, particularly in the case of small areas or domains. Research in this area is carried out in cooperation with universities at home and abroad. Economics research benefits from studies in the methodology of econometrics and time series analysis (another area where it makes sense to work closely with universities and research institutes) as well as from research and development into (economic) indices.

Statistics production relies largely on existing administrative registers and on linking data from these registers. *Research on the methodology of register-based statistics production* focuses specifically on register-based estimation and on questions of register quality and comparability. It is important to step up our research efforts here and particularly to work more closely with other statistical agencies in the Nordic countries and elsewhere. A common concern for the development of survey methods and register-based methods is to have *closer methodological integration of sample-based and register-based statistics production*. The aim is to facilitate the joint use of sample-based and register-based data sources.

**b) Statistical data processing.** Statistical methods research related to software developed for survey estimation and analysis is a new field of study. Methods research is needed in order to improve the existing software environment and to implement new software applications so that the need for in-house programming can be minimised. Cooperation with domestic and international partners in this area should yield important benefits.

A common concern for research into survey and register methods and for research into statistical data processing is to implement *a methodologically coherent software environment for sample- and register-based statistics production*. This is necessary for purposes of standardising the methodological quality of statistics production and for improving quality standards across the board. Several advanced statistical agencies are using this kind of software package, e.g. Statistics Canada's GES (Generalized Estimation System). The introduction of such a package at Statistics Finland requires a close examination of the statistical methodology related to the software.

**c) Statistical data disclosure methods.**

The importance of statistical data disclosure methods to statistical agencies is explained by the strict data disclosure regulations that are in place. For Statistics Finland, this represents an entirely new area of research. It comprises research and development in the disclosure methods required for the collection, storage, transfer, analysis, release and publication of data.

Statistics Finland shall closely follow developments in this field and join forces with Eurostat and universities in a concerted research and development effort. An example is provided by statistical data disclosure methods for georeferenced data needed in Geographical Information Systems (GIS) applications. Research in this area is currently carried out in cooperation with the University of Jyväskylä Department of Statistics.

**d) International research cooperation and the methodology of international comparisons.**

In its statistical R&D work Statistics Finland is relying increasingly on

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cooperation with universities. Internationally, the agency is working closely with other statistical offices and with Eurostat. Examples are provided by the national and international research cooperation within the context of the *Research Project for Social and Business Survey Methods*, cooperation with the University of Montreal and the KESO (Knowledge Extraction in Statistical Offices) and ADDSIA (Access to Distributed Datasets for Statistical Information and Analysis) joint projects under the EU. Key areas of cooperation in methods research include:

- the use of external auxiliary information for estimation purposes and the empirical, simulative and theoretical comparison of the statistical properties of estimators;
- the methodology of register estimation and register inference;
- the study of register characteristics and methods of estimating and adjusting register errors; and
- methods of estimating and adjusting measurement errors.

The methodology of international comparisons is a new area of research, covering among others:

- research designs of comparative research;
- sampling designs and methods of data collection;
- methods of assessing and adjusting sampling, nonresponse, frame and measurement errors;
- methods of coordination in comparative research; and
- methods of meta analysis.

This area of research lends itself ideally to international cooperation.

**e) Other statistical methods and production methods.** Statistics Finland shall remain on the lookout for new methodological innovations and study their applicability at Statistics Finland. These areas include:

- micro-simulation models;
- neural networks;
- data mining;
- digital media;
- applications of qualitative research methodology; and
- the combined use of quantitative and qualitative research methodologies.

New areas of research and development include scenario methods related to information society and their implementation, as well as methods of statistical quality control.

To coordinate data collection from companies, institutions and business units and to reduce the response burden, research and development is needed into the methods of enterprise demography. This is a new area of work which belongs to methods-oriented economic research.

**Other methods research.** Other important areas of research geared towards the development of statistics production are those of classification methods, information technology and quality management.

**a) Classification methods.** Classifications and code systems are important tools of statistical harmonisation both in Finland and elsewhere. With the growing needs for harmonisation in the European Union, standardised classifications have emerged as a

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central object of the development of official statistics in recent years. Among the most important EU standards are NACE (industry classification) and CPA (product classification). The Community has issued directives concerning several of its statistical standards, and Member States are obliged to draw up their own national standards in compliance with EU regulations. Since many international classifications are harmonised with the EU standards, the further development of those standards also requires close cooperation with the UN Statistical Division. Statistics Finland is expected to make an active contribution to the work of incorporating the appropriate changes into these classifications.

**b) Information technology.** R&D in meta-data and information architecture is a growing area of study at Statistics Finland's Information Technology Services. To make progress in this area universities in Finland will be contacted to look into the possibility of research cooperation.

The work that has been done so far in researching meta-data and information architecture is crystallised in Statistics Finland's production model, which is a vision of the structures that go into statistics production systems. The key idea is the integration of information systems. Modern, open systems create an environment which allow for flexible integration of different kinds of systems. The production model provides a framework within which this integration can take place.

Other operations at Statistics Finland, including research and development, are also influenced by this production model. Just as the production model serves as a framework for the integration of the statistical system, so it can create a frame of reference for the

evaluation and further development of research.

Electronic data collection and distribution is set to increase dramatically over the next three years. Printouts will increasingly be in electronic format, gradually taking over from traditional hard copies on paper. The Internet or some other comparable network will become an important channel of information distribution.

**c) Quality management.** The primary goal set out in Statistics Finland's quality policy is to put the agency among the world's leading statistical agencies and to achieve the points needed for the national quality award by the beginning of the millennium. This requires that the quality of all operations at Statistics Finland can be further improved, but also and importantly that the principles of quality management are extended to statistical systems and to personal quality.

A project is currently being started up for the identification, definition and measurement of core processes. The aim is to introduce the principles of process management alongside management-by-results with a view to optimising service standards and improving strategic control of operations.

The training provided by consultants from the US-based research institute Westat is now being put to the practical test in a number of ongoing quality projects at Statistics Finland. Other important quality projects include the wider adoption of the team organisation concept, the preparation of a quality manual and the introduction of CBM and checklist procedures. Quality improvement in these areas (particularly with regard to CBMs) requires a research input by the Statistical R&D Unit.

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### 3. Implementation of Research

This, the final chapter of this Document addresses questions related to staff resources and research implementation. The basic policy is to provide further and supplementary training to staff members with a view to strengthening their orientation to research and on the other hand to encourage research cooperation with universities, research institutes and other organisations both at home and abroad. An important precondition for a successful and cost-effective research effort is to create a good and comprehensive network of contacts with other research communities. Applications for research funding shall be directed increasingly to outside sources.

A basic premise in the allocation of research resources is the recognition that scientific research is a long-term effort; it is rarely possible to achieve immediate success in completely new areas of research. In each case it is important to find the right balance in terms of resource allocation so that the continuity of core areas of research can be guaranteed and so that research efforts can be stepped up and new projects launched where necessary.

#### **Staff Commitment to Research**

##### **Strengthening the orientation to research.**

In order to make a meaningful contribution to scientific research, any statistical agency needs first and foremost to have a challenging set of research problems and a competent and committed research staff. According to Statistics Finland's budget and action plan for 1997–1999, the agency shall seek to improve its sensitivity and responsive-

ness to current research and statistical needs by means of raising its level of expertise in key areas. This shall be achieved through natural staff turnover.

The agency must have a sufficiently large and competent research staff; at this stage the minimum requirement is two per cent of the workforce, which represents at least 12 working years of fully competent researchers. The key task of this group of experts is to identify and resolve methodological and substance problems. Recruitment of outside experts on a temporary basis can help to speed up the creation of the necessary critical mass.

Given the demographic structure of permanent staff at Statistics Finland and low levels of staff turnover, it is necessary to invest heavily in the activation of the agency's research resources. One relatively easy and inexpensive way of raising the agency's research profile is to encourage researchers to co-author reports and publications with outside experts. With Statistics Finland experts involved in these kinds of joint projects, they will also be able to make their expertise and knowledge of the data sets available from the very outset of the analysis. At the same time these projects help to give staff members a better knowledge and understanding of the subject concerned and the respective research methods.

**Further training.** Research projects for the completion of post-graduate degrees are an important part of learning and assimilating a strong research orientation. At the same time, the work which is done in these projects provides important additional qualifications for statistics production and research



work. Therefore every effort must be made to encourage post-graduate studies as part of the agency's overall research effort.

Almost half of the workforce at Statistics Finland today have an academic degree at the graduate level of higher education. By year-end 1996, seven staff had completed their doctorate, thirteen a licentiate's degree. The high level of staff education provides a solid basis for further training. An important way of encouraging staff to take up a post-graduate degree programme is to create within the agency a positive and supportive attitude towards research work. The agency shall make every possible effort to promote and support post-graduate studies. For instance, staff may be released for certain periods of time to prepare their research plans, or they may be assisted in applying for research grants from outside sources.

In staff recruitment special attention shall be paid to the applicants' scientific qualifications and their willingness to engage in research work at least on a part-time basis. In certain cases unpaid leave of absence may be granted to staff wishing to continue their studies at university. Each year Statistics Finland invites applications for a quota of "researcher months", providing an opportunity for staff to work on research projects during regular working hours. Decisions on how these months are allocated are made on the basis of the subjects of study specified in the applicants' plans and on the availability of funding. Another, more lasting way to strengthen the agency's research orientation is to revise job descriptions so as to contain a stronger research element.

**Supplementary training.** The challenges faced by academic staff in their daily jobs are crucial to strengthening their motivation

to supplementary training, both in methodology and in their particular specialisms. Rotation between different types of jobs should be made easier: staff could switch after a few years in a research and development project to working in the agency's contract research services and then further to continue their studies. This kind of rotation would help to increase the number of people with the competence to do complex background research and to engage in commissioned studies but who do not necessarily have a licentiate's degree or doctorate. Statistical or research assistants without academic degrees need to have a basic knowledge of statistics and the social sciences so that they can work independently in statistics production or take part in teamwork or information services. Needs for supplementary training either in-house or at a university or some other institution must be agreed upon separately for each unit.

Apart from providing post-graduate training courses for researchers, Statistics Finland also has cooperation with university centres for extension studies to offer professional development (PD) training.

The agency shall also continue to organise courses and seminars on different aspects of statistics and statistical methods, with lecturers including both Statistics Finland and outside experts. The best possible use shall be made of the statistical training programmes available, particularly the EU Training of European Statistics programme.

The role of the Statistical Library as a centre for research information shall be further strengthened.

**Allocation of research resources and organising research.** The most basic requirement for a quality research operation is to

have a competent and committed staff. At Statistics Finland the most flexible solution for securing an adequate research input is to release people from their regular duties to undertake research projects on a fixed-term basis, giving them the opportunity to complete a thesis or some other project which they could not do if tied to their normal duties. This requires a centralised system of resource allocation within the agency, funding from the units as well as external funding.

Applications for research funding shall be directed increasingly to outside sources, both domestic and international (and particularly the European Union). Important outside sources of funding for research work aimed at the completion of post-graduate degrees include the Academy of Finland and various foundations. Assessments of the research plans proposed must pay greater attention to quality; funding can only be made available if the plan is good enough.

Increasing importance shall be attached to participation in international scientific conferences and workshops. People attending shall normally be required to contribute a paper. Where possible conference papers shall be upgraded into scientific articles for publication.

Every effort shall be made to increase the publication of research results through international scientific journals. A major concern in this regard is to improve reporting skills. Another forum which is available for the scientific contributions of staff members is Statistics Finland's own Research Reports series, which was completely renewed in late 1995.

There are many areas of statistical research which require a joint effort by researchers across organisational boundaries, both internal and external. For instance, the study of the social effects of information so-

ciety requires expertise not only in the social sciences and economics but also in information science. Some of the necessary expertise and data resources are scattered across different units at Statistics Finland, some of the knowhow is to be found in universities and research institutes. Where possible resources for research shall be pooled in the form of joint projects and researcher networks.

The most important area of research and development for Statistics Finland is still that of statistical and other methods research. In conjunction with the reorganisation of methods work a new *Statistical R&D Unit* was inaugurated at the agency on 1 October 1996. This unit works closely with the relevant statistical units and researchers to produce up-to-date and scientifically valid methodological solutions for purposes of statistics production and empirical research. This requires both applied and basic research, which is done mainly in cooperation with universities and research institutes and other partners. The unit is also charged with the responsibility to provide training and consultation services in order to raise the standards of methodological knowhow in official statistics production. Where necessary the unit can also provide research facilities for agency staff working on temporary research projects as well as for outside researchers working at the agency for a fixed period of time and requiring the methodological expertise of the R&D Unit.

### **Cooperation with Universities and Research Institutes**

**Acquiring outside expertise.** In projects where the agency needs to respond quickly to emerging new phenomena or current

problems, Statistics Finland shall recruit outside experts to support the agency's own workforce. Teams shall be set up on a temporary or permanent basis and comprise the outside expert, an agency researcher, senior statistician (or corresponding) as well as a post-graduate student from the unit concerned.

**Fellowship system.** Statistics Finland has had encouraging experiences during the past few years from the fellowship system, a permanent arrangement for the use of outside expertise. Within this system top experts from Finland and abroad have been invited to work at the agency in a consultancy role for 2–3 months to help resolve specific methodological problems. One of these experts is Professor Carl-Erik Särndal from the University of Montreal, who has been actively involved in methodological research projects as well as provided supervision to post-graduate students. Each year 2–3 fellowship experts are invited.

**Outside researchers and post-graduate students at Statistics Finland.** Support for outside researchers and post-graduate students must be chiefly allocated to projects which make use of data sets compiled by the agency itself and which strengthen the professional competence of Statistics Finland staff. Outside researchers requiring access to sensitive data shall be given the opportunity to work at Statistics Finland to the extent that this is possible within the confines of the resources available. The needs and interests of supplementary training for Statistics Finland staff shall be taken into consideration in drawing up research contracts.

**Meaning of networking.** Networking, i.e. establishing contacts with researchers outside the agency, helps to raise standards of scientific research (both empirical and methodological) at Statistics Finland. One way to establish contacts is to take part in the scientific debate in the field of study concerned. Staff shall be supported in every possible way in their efforts to create contacts with other experts in their field. Networking is also an invaluable asset in scientific research itself. Participation in research networks obviously requires sufficient qualifications and competence in the field concerned.

One example of networking is provided by the agreement of cooperation signed on 8 October 1996 between Statistics Finland and the University of Jyväskylä. The aim of this contract is to promote and facilitate the utilisation of scientific research, to raise levels of staff competence, to make sure the agency will continue to have the necessary statistical expertise at its disposal, and to develop and introduce new, innovative methods of statistics production and distribution. One of the R&D projects under the umbrella of this agreement is the *Research Project for Social and Business Survey Methods*. Several staff from Statistics Finland are involved in this project in a capacity of post-graduate students.

Statistics Finland is also involved in the doctoral training programme *Population, health and living conditions*. This programme, coordinated by the University of Helsinki Department of Sociology, is a joint effort involving several universities and research institutes. Statistics Finland experts are involved in this programme as post-graduate students.

## International Research Cooperation

Through its involvement in international research projects Statistics Finland is well placed to influence and make decisions on the focal areas of R&D work, particularly on the European arena. The agency's active involvement in international research cooperation and the work to prepare proposals for new projects both call for an increased input into R&D. These activities shall be closely integrated with the agency's international consulting services.

**EU research projects.** Statistics Finland is currently involved in three EU research projects, KESO (Knowledge Extraction in Statistical Offices), ADDSIA (Access to Distributed Datasets for Statistical Information and Analysis) and TELER (Telematics for Enterprise Reporting), with funding provided through the fourth framework programme for the development of the European statistical system. It is important that Statistics Finland is also actively involved in the fifth framework programme (1998–2002), for instance by submitting proposals for new projects. As participation in each new project is restricted to one Scandinavian partner, Finland effectively has to compete for its place with its Nordic neighbours.

Through its SUPCOM programme (Support to Community Policies) Eurostat awards research grants, usually for one year at a time, to applicants who have a well-founded research proposal together with evidence of the necessary research competence. Successful candidates will need to join forces with universities and research institutes at home as well as with foreign organisations as appropriate.

Smaller but nonetheless significant research grants can also be obtained through country-specific research contracts with Eurostat. Statistics Finland has used this source to fund a longitudinal study on enterprise materials and the preparation of a sampling plan for waste statistics, for instance.

**The 52nd Session of the ISI in Helsinki in 1999.** It is important that Statistics Finland makes a strong scientific contribution to the 52nd Session of the International Statistical Institute in Helsinki in 1999. Suitable research and development themes supporting Statistics Finland's methodological and other development needs include for example the statistical methods related to the use of registers in statistics production, the evaluation of the quality of registers, new applications of demographic methods, Geographical Information Systems (GIS) applications, the use of microdata in enterprise statistics, Total Quality Management (TQM), the System of Integrated Environmental and Economic Accounts (SEEA) and the measurement of technology levels.

## Statistics Finland's Research Services

Statistics Finland's research services comprise the various forms of expert assistance made available to researchers for the elaboration of existing data sets or the collection of primary data. Methodological expertise is available for researchers in such areas as sampling, research designs, methods of data collection, statistical programs and statistical analysis.

The backbone of statistics production is formed by administrative data, which are

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well-suited for research purposes in that they are unique and comprehensive. They are also in machine-readable format and inexpensive to use. The linking of data from different registers and different years provides a new and interesting angle for researchers.

Statistics Finland's expertise in the use of sample-based survey materials is particularly strong in the areas of living conditions and social statistics as well as the related statistical methodology. Through its experience in the planning of research, its experienced network of interviewers and extensive national samples, Statistics Finland continues to produce useful survey data sets for researchers. Statistics Finland's expertise in statistical methodology is often valuable in the use of these materials.

Statistics Finland's public image as a competent, respected statistical agency which provides a high quality research ser-

vice must also be reflected in its fee-based operations. Closer links must be established between the agency's scientific expertise and its fee-based contract research. Statistics Finland's main asset in the competition with commercial research institutes is the quality of its operation. To provide value for money, the agency needs to have in place a full range of high-quality research services, including extensive survey and register data sets, expertise in sampling methods, innovative use of computer-aided telephone interviewing (CATI) and computer-aided personal interviewing (CAPI) techniques, careful testing of interview questions, professional and competent use of statistical methods of analysis and effective use of its expertise in the definition of research problems, in the planning of research and in the search for appropriate research designs.

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## APPENDIX I.

### Defining the Scope of Research

The definition of what research actually comprises in a statistical agency is no simple and straightforward matter. For the purposes of this Document research (and related development work) is defined as the systematic application of theories, concepts, methods and principles of scientific research in an attempt to increase existing knowledge and to apply that knowledge in the development of new practical applications. A distinction can be made between three levels of research (questionnaire on R&D statistics):

*Basic research* produces new information, but it is not primarily aimed at discovering new practical applications. Basic research produces and tests new concepts, hypotheses and theories.

*Applied research* produces new information and aims on this basis to discover new practical applications. Ultimately the goal is to find better methods for resolving existing problems.

*Development work* is based on both research and practical experiences, which are used for the introduction of new products, production processes, systems and methods or for the improvement of existing ones.

In practice, of course, there can be and often is overlap between these levels. For instance, applied research and development work may also involve basic research.

Scientific research is characterised by the *principle of knowledge accumulation*. For

this to be possible research is expected to follow the *principle of transparency*, i.e. all research results shall be published in appropriate fora (scientific and other similar journals, international scientific conferences, etc.). The principle of transparency, for its part, makes possible another important aspect of scientific research, i.e. the *availability of research results for evaluation by the international scientific community*.

There are certain areas of statistics production that are not counted as research proper even though they often provide crucial supportive material for research purposes. One such area is represented by background investigations carried out for planning and decision-making purposes. Typically, these investigations will be conducted for a specific end-purpose, aiming to describe the phenomenon in hand. The results will have limited applicability and be used by a limited number of people. Another example of work which is not counted as research is data collection for general purposes (i.e. not for specific research purposes), such as document archiving, current opinion polls, etc. Similarly, work that is done in software applications for data processing is not normally counted as research unless the application is related to the development of new, general-purpose software or to upgrading old programmes.

## APPENDIX 2.

### Finland and Statistics Finland in Brief

#### Finland and statistics research in Finland in a nutshell

Finland covers 338,000 square kilometres, 70 % of which consists of forests and 10 % of water in the form of 188,000 lakes and 600 rivers. There are nearly two million saunas in Finland for a population of 5.1 million. Almost all of the 400,000 summer cottages in the country and most houses have a sauna, but there are also over one million flats which are equipped with one. When Finnish people unwind on a Saturday evening in sauna, 93 % speak Finnish, 6 % Swedish (which is the country's second official language) and 0.03 % speak Sami (the language of the indigenous Sami population in Lapland).

Finland has been member of the United Nations since 1955, the OECD since 1969 and the European Union from the beginning of 1995. Parliament consists of 200 members who are elected for a four-year term. The President of the Republic is elected every six years; since 1994 the post has been held by Mr Martti Ahtisaari. Finland was the first country in the world to give women the right both to vote and to stand as candidates in all elections (1906). Today one-third or 68 of the 200 seats in Parliament are held by women, and 7 of the 18 Cabinet Ministers are women. Large numbers of women are gainfully employed, with 70 % in the labour force.

The number of mobile phones and Internet subscribers in Finland is among the highest in the world. Over 90 % of all households have a telephone. For the education

and enjoyment of Finnish people and their guests there are almost 1,000 public libraries in the country, 37 major research libraries, 29 orchestras, 63 professional theatres, 265 museums and 56 daily newspapers.

There are 13 statistics departments in the country's 17 universities. The departments of statistics are organised under either faculties of social sciences or faculties of mathematics and computer science. Many other faculties also offer foundation courses in statistics.

An example of statistics education is provided by the Master's Programme in Statistical Systems at the University of Jyväskylä Department of Statistics. The purpose of the programme is to provide students with the competencies they will need as professionals in the collection, analysis, management and dissemination of large data sets. The programme concentrates on survey methodology, including sampling theory and the analysis of complex surveys.

Main areas of statistics research at universities include: Bayesian Statistics, Biostatistics, Demography, Econometrics, Epidemiology, Generalized Linear Models, Life-history Analysis, Linear Models, Mathematical Statistics, Multivariate Analysis, Non-parametric Statistics, Sampling, Statistical Computing, Spatial Processes, Statistical Methods for Quality Improvement, Statistics of Agricultural and Forest Sciences, Stochastic Processes, Survey Methodology, and Time Series Analysis.

Other research organisations and their main areas in statistics research (in parentheses) are: the Agricultural Research In-

stitute (Experimental Design), the City of Helsinki Information Management Centre (Urban Statistics), the Forestry Research Institute (Statistical Methods of Forest Mensuration), the National Health Institute (Biostatistics; Epidemiology), the Research Institute of the Finnish Economy (Statistical research in econometrics), and Statistics Finland (Survey Sampling; Survey Analysis).

The Finnish Statistical Society, founded in 1920, is a non-profit-making learned society the aim of which is to promote the development of statistical theory and its applications and to bring together statistics and other professionals in different fields of statistics and research. The members (some 500 in total) represent statisticians working at statistics departments in Finnish universities as well as in statistical offices and research institutes.

### Official Statistics in Finland

Official statistics are compiled by some 30 authorities including the Agriculture and Forestry Administration, the Association of Finnish Local Authorities, the City of Helsinki Information Management Centre, Customs Administration, the National Research and Development Centre for Welfare and Health, the Social Insurance Institution, Statistics Finland, and local municipalities.

The main responsibility for compiling official statistics rests with Statistics Finland, which accounts for 75 % of all government statistics. The agency also supervises and coordinates the statistical work of other authorities. Statistical activities in Finland are governed by the Statistics Act, which lays down the general principles of collecting data and compiling statistics, the duty of disclosure, and confidentiality. Statistical informa-

tion is disseminated extensively in the media: each year newspapers and related publications publish a total of 15,000 news reports or articles based on material released by Statistics Finland.

Finland's membership of the European Union has greatly increased the amount of work done within international organisations. The main goals are to improve the international comparability of statistics and to promote the use of international statistics. Contacts with the EU's statistical agency, Eurostat, are particularly close. International consultation is of growing importance, particularly the development of statistics in the former Soviet Republics that are making the transition to market economy.

An independent Finnish statistical office was founded in 1865, when Finland was still an autonomous grand duchy of Russia. The first statistical yearbook was published in 1879. After 1917, when Finland gained independence, new statistics were established on such things as social problems and economic trends. National accounting was introduced in 1947, immediately after the adoption of the UN recommendation.

Statistics Finland currently has a staff of about 900, including 160 part-time interviewers in different parts of the country. Just over 80 % of the agency's expenditure is covered from the state budget, the rest mainly from fees charged to service users.

The agency is divided into nine units, three of which are mainly concerned with internal and external services, while six are statistical units proper.

**Population Statistics** compiles figures on population, education, elections and also on housing and regional employment statistics.



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**Social Statistics**, responsible for the agency's sample survey and interviewing activities, compiles data on employment, incomes, consumption and other aspects of living conditions. It also produces data on culture, leisure time and the environment.

**Prices and Wages Statistics** is responsible for data on prices and wages, and statistics on labour disputes.

Business Statistics comprises two units, **Business Trends** and **Business Structure**, which collect data from businesses and process the material into statistics describing various industries.

**Economic Statistics** combines data from several basic statistics to form the system of National Accounts. It also releases various economic indicators on total production and the financial markets.

Statistics Finland obtains most of its data from various registers (about 90 %) but also directly from enterprises, households or individuals. The use of administrative records as data sources is on the increase, which also helps to alleviate the response burden. The agency's

160 interviewers use laptop computers and modern data transfer methods in the collection of survey data by means of telephone or face-to-face interviews. Survey data sets collected by Statistics Finland have been made available to numerous outside researchers, some of whom have worked in office space provided at the agency.

The recently inaugurated **Statistical R&D Unit** employs specialists in different areas of statistical and methodological expertise. In addition to this centralised unit, a number of employees specialising in statistical methodology work in the statistical production units. In addition to the Director of Research, appointed separately for each upcoming year, other experts from Finland or abroad have been invited to work at the agency under short-term fellowship arrangements.

The **Scientific Advisory Board** supervises research activities and helps to draw up main lines of future research work. Several Finnish universities and research institutes are represented on the Board.

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# KATSAUKSIA

## Statistics Finland: Main Lines of Research and Development in 1997-1999

Statistics Finland has a long and impressive research record. The agency actively promotes social, economic and methods research as well as the publication of research results. This report outlines the main lines of research for the next three years at Statistics Finland. Separate treatment is given to the focal areas of interest in social science and economic research, on the one hand, and statistical and other methods-related research, on the other.

Continued support will be made available to research in those areas that are central to the needs of high-quality, up-to-date and relevant statistics production. An active and effective network of cooperation with Finnish universities and research institutes is an important means of furthering those objectives.

The principles and practical measures detailed in the programme aim at maintaining a productive and active research community in the agency. Moreover, the programme includes an up-to-date account of the various facets of the agency's research activities. The preparation of this document has been coordinated by Statistics Finland's Scientific Advisory Board.

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