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From data to decisions: How does Statistics Estonia help make society more informed?

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KEY MESSAGES

- In Estonia, administrative register data provide a strong foundation for the cost-effective analysis of societal developments, supporting evidence-based policymaking and practical solutions. Surveys are primarily used to collect data on attitudes, opinions and perceptions.
- In addition to producing official statistics, Statistics Estonia conducts commissioned studies and enables the use of its data for academic research.
- Faster and more effective reuse of data in Estonia requires stronger data governance and higher levels of data literacy.

INTRODUCTION

A vast amount of administrative data is generated in Estonia every day – in schools, businesses, public authorities and daily life. However, its potential often remains underused, as awareness of available data and their effective use is limited. Statistics Estonia plays a central role as the producer of official statistics, linking data from different domains to create a comprehensive and reliable picture of how Estonian society functions. The example of education shows how

data linkage and analysis support evidence-based policymaking, labour-market planning and overall societal well-being. This article examines how administrative and survey data are currently used, why they must be further developed and how Statistics Estonia helps embed data-driven decision-making in public governance.

Education is at the heart of this Human Development Report. It is a field that affects everyone,



from national education policy to each individual's learning pathway across the life course. The education system collects data on pupils, teachers, curricula, the school network and levels of education. When these data are linked with one another and with other registers – such as population, employment and social registers – it becomes possible to analyse which educational pathways lead to higher earnings, how educational attainment affects migration, and in which regions shortages of teachers and support specialists are most acute. Such data linkage provides a comprehensive and up-to-date overview of Estonia's education system and supports more informed decisions in education policy and labour market planning, which in turn shape economic performance and overall societal well-being.

In a data-driven world, the clarity and accessibility of reliable information are as essential as individuals' own critical thinking. This is where Statistics Estonia plays a central role. As a producer of official statistics, it is responsible not only for describing social and economic phenomena but also for promoting data literacy, helping people in Estonia understand what data are available and how to use them effectively. Estonia has only two producers of official statistics – Statistics Estonia and Eesti Pank. The production of official statistics is governed by the Official Statistics Act, which sets out the obligations, rights, rules and principles that official statistics producers must follow. Its purpose is to ensure that users can rely on the quality and integrity of the data. Statistics Estonia thus bears significant responsibility in serving the public interest.

Official statistics offer a reliable picture of societal conditions and change, equipping decision-makers with information on developments in the population, social sphere, economy and environment. The data collected by Statistics Estonia are used in drafting development plans and forecasts, shaping policy, conducting academic and applied research and supporting evidence-based decision-making.

THE USE OF REGISTERS AND OTHER DATABASES IN OFFICIAL STATISTICS

Only statistical activities that are clearly justified and necessary for the regular monitoring of societal developments are included in the national official statistics programme. Under this programme, Statistics Estonia publishes data, infographics and other outputs in its database and applications, and transmits statistics to Eurostat, the statistical office of the European Union. These data are used by policymakers and other stakeholders in decisions that affect society.

Under the Official Statistics Act, Statistics Estonia may request data from various registers for statistical activities included in the national official statistics programme. The required variables are specified in agreements concluded between Statistics Estonia and the owner of the relevant register. The principle of data minimisation applies: the register holder provides only the data strictly necessary for carrying out the specific statistical activity.

Statistics Estonia also collects data through thematic surveys. As a result, it holds an extensive body of data covering multiple fields and time periods, which can also be used for academic research.

National registers offer considerably broader potential than official statistics alone, whose scope is defined by European Union regulations and the data needs of public authorities. When collecting data for official statistics and investing in registers, their potential for reuse should therefore always be considered – including uses that Statistics Estonia may not anticipate but that could prove valuable to other public sector institutions, researchers, the private sector or society more broadly.

THE ADVANTAGE OF A REGISTER-BASED CENSUS IS SPEED

A clear example of the extensive use of register data is the 2021 Population and Housing Census. The mandatory variables required under the

relevant European regulation – such as place of residence and educational attainment – were obtained from national registers. As a result, the lengthy questionnaire used in the 2000 and 2011 censuses was no longer necessary. Following the example of the Nordic countries, Estonia moved to a register-based census, as did the other Baltic states.

The main advantage of a register-based census is speed: the data were published within one year of the reference date, whereas in 2011 the process took nearly two years. In a context where timely data are expected, such a delay would now be difficult to justify. A register-based approach also makes it possible to update census information annually without repeatedly surveying the population, rather than only once a decade as in the past. Importantly, the use of register data does not compromise data quality.

However, the census variables were not available in registers in a one-to-one format; most had to be constructed from multiple sources. For example, around 20 different data sources were combined to determine place of residence. This illustrates the flexibility of reusing register data, compared with survey data, which are often used only once.

EDUCATION DATA ARE USED IN MULTIPLE WAYS

In education statistics, a clear example of data linkage is the derivation of the highest level of educational attainment of the population – that is, the highest completed level of formal education for each individual – by combining data from several sources, including the Estonian Education Information System (EHIS), which contains documentary records, and the Population Register, which is based on individuals' self-declared information. Although documentary sources are preferred, Population Register data are important where a person has completed their education outside the Estonian education system and this information is not fully recorded in EHIS.

EHIS also underpins other areas of education statistics, including early childhood education, general education, vocational education and higher

education. Similar information is published by the owner of EHIS, the Ministry of Education and Research, on its Haridussilm platform. However, the added value of statistics compiled and published by Statistics Estonia lies in the possibility of linking these data with variables from other domains, such as population statistics, including mother tongue and socioeconomic background.

In addition, education data are collected through the Labour Force Survey, which forms the basis for calculating Eurostat's education indicators.¹ When conducting surveys, increasing attention is paid to reducing administrative burden and reusing existing data. For example, the Estonian Labour Force Survey draws on EHIS to obtain information on individuals' ongoing studies, meaning that respondents generally do not need to provide these details themselves.

Beyond the annual education indicators, more comprehensive adult education surveys are carried out every five to six years under Eurostat's coordination, both as household and enterprise surveys (AES – Adult Education Survey; CVTS – Continuing Vocational Training Survey). These provide information on the scope, forms and trends of adult education and job-related training.

The AES examines the extent and forms of adult participation in learning, including formal, non-formal and informal education. It also gathers information on the motivations and barriers affecting participation.

The CVTS focuses on job-related training provided by enterprises. It collects data on the scale of training activities, employee participation, training expenditure and the types of training offered. The results help assess employers' contribution to skills development.

WHEN OFFICIAL STATISTICS ARE NOT ENOUGH

Public governance and institutional decision-making often require information that goes beyond regular official statistics. Society evolves continuously – new phenomena emerge and new challenges arise that cannot always be addressed through standard statistical outputs.



In some cases, a one-off and more in-depth analysis is needed. A clear example is the Covid-19 crisis, when urgent analytical needs concerned remote working, mobility patterns and the rapid production of mortality and hospital capacity statistics.

New data sources and methods for producing and analysing statistics are continually emerging. At the same time, different stakeholder groups may require information on more specific target groups than is usually available in national statistical outputs.

If a required breakdown is not available in published tables but the underlying data exist, it is possible to commission a paid extra-programme statistical analysis. Such work may be requested by researchers, those preparing legislative amendments, companies such as research firms, or representatives of interest groups such as farmers' organisations. This makes it possible to combine data sources and carry out analyses that fall outside the scope of regular official statistics.

Extra-programme statistical work may also include commissioned surveys. For example, at the request of the Ministry of Education and Research, Statistics Estonia conducts the Programme for the International Assessment of Adult Competencies (PIAAC).² As in the production of official statistics, register data were used in this survey to pre-fill parts of the questionnaire. Respondents could review and correct the pre-filled information. These data included, for example, year and month of birth, sex, highest completed level of education, and job title and occupation, based on information from the Employment Register.

At the request of various public institutions, Statistics Estonia has prepared analyses based on existing or previously collected data, including both register and survey data. For example, an analysis of the economic impact of international students³ combined education and employment data, while a study of young entrepreneurs⁴ examined the factors influencing young people's transition into entrepreneurship.

Education policymaking has benefited significantly from the possibility of commissioning such studies and analyses. These activities have

generated substantial knowledge about the education sector – insights that would not have been possible without the extensive use of register data. Let us now consider recent examples of commissioned work related to education.

EXAMPLE 1. The impact of introducing tuition fees in vocational education: adult learners in vocational education and lifelong learning

An analysis of adult participation in formal vocational education and lifelong learning⁵ examined how the introduction of tuition fees in vocational education affects adult learners and what alternatives to vocational study exist, such as other forms of training. For this purpose, data from the Estonian Education Information System, the Statistical Population Register, the Employment Register of the Tax and Customs Board, and the Estonian Labour Force Survey were combined. The analysis covered adults aged 20 and over who were enrolled in formal vocational education or participated in in-service training between 2019 and 2024.

The study supports the state in planning vocational education reform, as a substantial number of young learners are expected to enter formal education. As a result, fewer state budget resources will remain available to fund tuition-free study places for adult learners.

The analysis identified three main risk groups:

- **Russian-speaking residents of Ida-Viru County**, whose previous education may no longer meet current labour market needs;
- **individuals with experience of unemployment**, who may lack the financial means to participate in fee-based training and may recently have completed studies in another field;
- **older learners** who would prefer to focus on their studies rather than combine them with work, but for whom too little time has passed since their previous studies to enrol in a new programme.

EXAMPLE 2. Annual analysis of the economic impact of international students

At the request of the Education and Youth Board, Statistics Estonia has conducted six analyses of the revenue generated for the state by international students studying and working in Estonia.⁶ The most recent study showed that in the 2023/2024 academic year, nearly half of the 4,336 international students were employed. Together, they paid 5.4 million euros in income tax and 10.3 million euros in social tax. Their average monthly salary was similar to that of employed local students – slightly over 1,600 euros. In addition, many young people from abroad remain in Estonia after completing their studies and entering employment: half of graduates stayed to work in Estonia in the year following graduation. During their studies, international students most often work in engineering, manufacturing and construction, or in education. After graduation, those most likely to remain are graduates in information and communication technology, and in engineering, manufacturing and construction. This is likely supported by the large number of companies in these fields offering an international working environment in Estonia.

EXAMPLE 3. Where do young teachers go? Analysis for 2015–2022

In the context of the current teacher shortage, an analysis entitled ‘The career trajectories of teachers in 2015–2022’ was conducted in 2022.⁷ The study examined the career paths of individuals who were working as teachers in 2019 and the subsequent changes in their employment. Particular attention was paid to those who had recently entered the profession.

The findings show that young teachers remained in their positions more consistently over both one and two years than young people in other occupations. After three years, 60% of teachers were still in the same job, whereas half of their same-age peers in other occupations had already moved on. Job mobility is common among young people in general, and teachers do not stand out negatively in this respect.

EXAMPLE 4. Analysis of target groups in adult education in Estonia

The analysis of priority target groups in adult education identifies which population groups participate more actively in adult education and how the main target groups are distributed across counties, as well as in Tallinn and Tartu. It provides an overview of the key target groups in adult education in Estonia. The study required the use of a large volume of data, including Statistics Estonia’s Statistical Population Register, migration data, the Estonian Labour Force Survey, business demography statistics, data used for policy impact assessment, data from the Social Insurance Board, the Employment Register, and data from the Tax and Customs Board.

In addition to education-related topics, Statistics Estonia has supported policymaking in areas such as health, labour policy, tourism and entrepreneurship. The use of national administrative datasets has saved considerable time and resources that would otherwise have been required for survey research. Moreover, register data enable much more detailed analysis, because no sample-based survey can provide information as comprehensive as that available from administrative registers.

DATA FOR RESEARCH

In academic research, data are commonly accessed through Statistics Estonia’s secure data laboratory. Subject to the necessary permissions from the Data Protection Inspectorate and an ethics committee, researchers are granted access to microdata, which they analyse in accordance with strict data protection requirements. The required datasets are prepared by Statistics Estonia’s staff, and individuals cannot be directly identified, as the data are pseudonymised. External data can also be imported into the secure environment for joint analysis. Using this approach, researchers from Estonia and other countries have examined fertility trends, the gender pay gap, regional income inequality, the effectiveness of inclusive education policies and many other topics.

EXPECTATIONS FOR STATISTICS ESTONIA IN ENHANCING THE VALUE OF DATA

In recent years, both the government and stakeholders in Estonia have called for faster and more effective reuse of existing data to improve the availability of information for policymaking and reduce administrative burden. In the European Union and globally, data are increasingly viewed not as a by-product but as an asset that can contribute to economic development. The potential of the data economy is considered significant, but realising it requires high-quality data and the ability to use them effectively – in other words, data literacy.

Although the once-only principle in data collection has long been recognised in Estonia's public sector, the rise of artificial intelligence has further underlined its importance. High-quality data are the foundation for the effective use of artificial intelligence, which is already essential for maintaining global competitiveness from both a societal and an economic perspective.

As a result, expectations of statistical offices are rising in Europe and worldwide. Since data from multiple domains are brought together at Statistics Estonia for the production of official statistics, it is reasonable to expect that the office has the strongest expertise and capacity in data governance. Since 2019, Statistics Estonia has had a statutory mandate under the Official Statistics

Act to coordinate data governance across the state. It has issued guidelines and provided advisory services to Estonian public authorities on improving data management and ensuring interoperability.

In Statistics Estonia's development plan for 2023–2030, promoting data literacy is identified as a key organisation-wide objective. The aim is to ensure that data are used correctly and effectively, and that Statistics Estonia serves as the primary and most trusted source of data on Estonia. To strengthen data competence, the office engages actively with its partners, provides guidance on interpreting and using data through its website, and offers data training on request. It also develops data stories and applications, such as dashboards⁸ and the salary application,⁹ in which data are presented in an accessible and engaging way. Statistics Estonia has thus already taken steps to meet these growing expectations.

SUMMARY

More effective data reuse requires strong data governance and data literacy across society. By linking data from different sources, Statistics Estonia, as the producer of official statistics, plays a central role in providing reliable knowledge and in embedding data use as a routine part of public governance. The example of the education sector demonstrates that integrating and analysing different types of data supports evidence-based policymaking, labour market planning and overall societal well-being.

REFLECTION

Dan Bogdanov

Oh, if only we had as many people asking questions as the Republic of Estonia has data to answer them.

Perhaps proper data governance would then be valued more highly, and the necessary services and capabilities would be developed. Estonia's e-state is older and more mature than that of

many other countries, and as a result we have accumulated a substantial body of data. It is true that at least once a year someone complains about how complex and inconvenient access to data can be, or asks, 'Why can't we simply look it up?' In other words, there is a clear demand for secondary use of data. Estonia needs this.

Unfortunately, at least once a year – and regrettably more often – we also read in the press how an Estonian organisation has ‘revolutionised’ secondary use and, whether through negligence or with the help of cybercriminals, has allowed data to become public.

And what of it? Is privacy not dead anyway in the age of social media and artificial intelligence?

The problem is that society does not know – or does not fully grasp – how much power can be exercised over a person when everything about them is known. Social media users can be more easily persuaded to buy products or even to change their beliefs. Wider circulation of health data would undermine the very logic of health insurance and make the lives of leaders and politicians more precarious, exposing them to blackmail.

In one version of an Estonian folktale, the Devil had resolved to prevent the builder of St Olaf’s Church in Tallinn from placing the cross on the roof. The builder’s protection lay in keeping his name secret, as knowing a person’s name was believed to confer power over them. The name was unwittingly revealed by his wife, who, while singing to their child one evening, promised that once the church was finished, Olev would return home with treats. Later, as Olev was setting the cross in place, someone shouted from below, ‘Olev, Olev, the cross is crooked!’ Startled, he fell from the tower and died. Our forebears – like many indigenous peoples around the world – understood the power that a name can hold over a person.

One of the most tragic contemporary examples of data reuse comes from Afghanistan after the withdrawal of the United States. A biometric database and related equipment created for the state fell into the hands of the Taliban, making it far easier to identify those they deemed undesirable.

Should we allow fear to hold back innovation?

No. Fear clouds judgement and stifles action.

We must ensure that our institutions are strong and adhere to their principles. At the same time, we must prepare for a future in which, for example, budget cuts or shifts in management culture

weaken institutional memory and organisational safeguards. To mitigate this risk, privacy-enhancing technologies should be introduced to make unauthorised or unintended secondary use of data as difficult as possible, including within organisations themselves.

How can this be achieved? Public authorities in Estonia are currently facing budget reduction targets. Investments in data and artificial intelligence under Estonia’s AI strategy are justified by the prospect of reducing future costs by streamlining the state – with technology replacing human labour. Should the aim be a smaller or a stronger Statistics Estonia?

The current Official Statistics Act both permits and restricts the processing of state data. Statistics Estonia may process data but is not allowed to share them. My wish is that Statistics Estonia should not have greater capacity to track individuals through location data than the Police and Border Guard Board. At the same time, I want more value to be created from data in Estonia. We do not have the resources to duplicate this function and expertise elsewhere.

By European standards, Statistics Estonia is highly innovative and forward-looking. Should it perhaps become a Data Agency instead?

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