STATISTICS DENMARK

Documentation of statistics for ICT Use in Enterprises 2017

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1 Introduction

The purpose of the statistics is to shed light on the use of ICT in enterprises, including e-commerce and benefits/barriers to the use of ICT. The statistics form part of Statistics Denmark's focus on the information society. The survey has been carried out annually since 1998. The survey is harmonized with the EU model questionnaire, which is used in most member states.

2 Statistical presentation

The statistics are published annually and describes the use of ICT in enterprises in Denmark. The following areas are covered: The diffusion and use of ICT and the Internet, including ICT systems and e-commerce. A considerable number of variables are replaced each year as a result of the development in user needs and the need to measure new technology. The survey covers enterprises in the private, non-financial urban industries with at least 10 full-time employees.

2.1 Data description

In the 2017 survey, the statistics cover the following main topics related to ICT usage and e-commerce in enterprises: ICT specialists and skills, access to internet and mobile broadband, websites and social media, cloud computing, sharing of information electronically within the enterprise (ERP, CRM), sharing Supply Chain Management Information electronically, use of internet-connected sensors, machine learning and artificial intelligence, radio Frequency Identification (RFID) technologies, GPS and satellite-based services, E-commerce and invoicing, introduction of new machinery and equipment, utilization of surplus capacity. Limitation of the population to enterprises in the private, non-financial urban industries with at least 10 full-time employees is determined by EU regulation.

2.2 Classification system

Survey results are generally reported by activity and size class. The applied activity nomenclature is Danish Industrial Classification 2007 (DB07), internationally NACE Rev.2. By activity groupings, Statistics Denmark's standard groupings are applied. For further information, see Danish industrial classification.

In the StatBank, the size of companies is defined by the number of full-time employees, divided into groups 10-49, 50-99, 100-249 and 250+ employees. The survey from 2016 included exceptionally enterprises with 5-9 full-time employees. The survey in 2017 covers only enterprises with at least 10 full-time employees.

2.3 Sector coverage

The survey covers private, non-financial enterprises, excluding primary activities such as agriculture, forestry and fishing, mining and quarrying. The financial sector is only covered in the reference periods 2005 to 2010.

2.4 Statistical concepts and definitions

Use of Social Media: An enterprise is seen as an active user of social media, if it has a user profile, an account or a user license to a social media. Advertising alone does not imply active use. Social media are sites where contents may be shared with other users. Social media include social networks (such as Facebook and LinkedIn), multimedia content-sharing websites (such asYouTube, Flickr and

Picasa), enterprise's own blog or microblog (such as Twitter) and wiki-based knowledge sharing tools.

Cloud Computing: Cloud computing refers to ICT services that are used over the internet to access software, computing power, storage capacity etc., where the services have all of the following characteristics: i) are delivered from servers or service providers, ii) can be easily scaled up or down, iii) can be used on-demand by the user, at least after the initial set-up, iv) are paid for, either per user, by capacity used, or they are pre-paid.

E-commerce: E-commerce is the sale or purchase of goods or services conducted over the internet or other computer networks. Orders placed by e-mail are not included. The payment and delivery of the goods or services do not have to be conducted online. E-commerce covers: i) web e-commerce, i.e. orders made at an online webshop or via web forms on the internet or extranet, and ii) EDI e-commerce, i.e. orders placed through electronic transmission of EDI-type business messages allowing for automatic processing and without the individual message or order being manually typed. EDI e-commerce in practice is business-to-business e-commerce.

Speed of Internet Connection: The maximum contracted download speed of the fastest internet connection.

Sharing of information electronically within the enterprise: Automated sharing of information within the enterprise concerns automated sharing of information across business functions in your enterprise, e.g. using resource- and customer management systems. An ERP (Enterprise Resource Planning) is a software package used to manage resources by sharing information among different functional areas (e.g. accounting, planning, production, marketing, etc.) CRM (Customer Relationship Management) refers to any software application for managing information about customers

Sharing Supply Chain Management Information electronically: Sharing information electronically on Supply Chain Management means exchanging all types of information with enterprises either suppliers or customers about the availability, production, development and distribution of goods or services. This information may be exchanged via websites, networks or other means of electronic data transfer, excluding e-mails not suitable for automated processing or manually typed.

GPS and satellite-based services:

Internet-connected sensors: Internet-connected sensors are independently connected to the Internet and are able to collect and transmit information and possibly act on that information. This includes sensors that can measure, detect or control pressure, motion, temperature, humidity, sound, vibration, speed, position and proximity. Sensors that are not connected to the Internet are not covered in this survey.

Machine learning and artificial intelligence: Machine learning and artificial intelligence includes the use of computer software, which with a starting point in data “thinks”, analyzes, problem solves and forms connections in patterns, for instance images, audio and text. It may include computer generated annual report, chat bots or automated marketing.

Radio Frequency Identification (RFID) technologies: The use of Radio Frequency identification technologies (RFID) - refers to an automated identification method to store and remotely retrieve data using RFID tags or transponders, - includes the use of Near Field Communication (NFC) connectivity standard

An RFID tag is a device that can be applied to or incorporated into a product or an object and transmits data via radiowaves.

2.5 Statistical unit

Enterprise.

2.6 Statistical population

The population is private, non-financial enterprises with 10 or more persons employed. The population does not include primary activities such as agriculture, forestry and fishing, mining and quarrying.

2.7 Reference area

Denmark.

2.8 Time coverage

1998-

2.9 Base period

Not relevant for this statistics.

2.10 Unit of measure

Percent of enterprises and percent of revenue.

In the StatBank table ITAV1-ITAV5 are specified the percentage of companies that either have answered "Yes" or "No" to a question (categorical variable). There are companies that have not answered all questions, so the sum of the categories "Yes" and "No" does not total up to 100 percent.

In StatBank table ITAV6 is specified the percentage of total revenue.

2.11 Reference period

01-01-2016 - 31-12-2016

2.12 Frequency of dissemination

The survey is published annually.

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2.13 Legal acts and other agreements

The Act on Statistics Denmark (Lov om Danmarks Statistik), cf. Order no. 15 of 12 January 1972, as amended by Act no. 386 of 13 June 1990, Act no. 1025 of 19 December 1992 and Act no. 295 of 2 May 2000. EU Commission Regulation (EC) No 960/2008.

From 2006 the survey is a part of the EU regulation on statistics on the Information Society (EC regulation No. 808/2004).

2.14 Cost and burden

The reporting burden is set at 2,340 hours for 2,968 enterprises that have answered the question concerning time consumption (total sample was 3.926 companies). It gives an average time per enterprise about 47 minutes.

Questionnaire 2017

2.15 Comment

It-anvendelse i virksomheder.

3 Statistical processing

The statistics is annual and questionnaire-based. Information is reported digitally.

Validation includes checks and supporting information built into the digital form, combined with subsequent checks and recontact to reporting enterprises.

The published results are grossed up to population level. Stratification is based on activity and enterprise size class.

3.1 Source data

The survey is based on questionnaire information from a sample of enterprises. The sample is stratified by industry groups and size (defined by number of employees). The sample is 4,098 units, and of these, 2,889 also extended to the 2016-sample, ie 70 percent of the sample in 2017 are repeats from last year. Net sample is 4,032 units, and there were 3,926 responses. For the calculation of E-commerce's share of revenue, information from the Business Register (ESR) is used.

3.2 Frequency of data collection

Yearly.

3.3 Data collection

Digital reporting via http://www.virk.dk. Reporting.

3.4 Data validation

A number of checks and validation mechanisms as well as reporting aides for the reporter's understanding of the questionnaire are built into the digital form. This includes among other things checks on sum totals of quantitative fields (e.g. that reported percentages add to 100 per cent) as well as filter and routing mechanisms (e.g. so that information cannot be reported in fields, where the enterprise should not provide any information). Once data is received by Statistics Denmark a number of additional checks are performed. These are performed in part at macro level, where e.g. the results for a given variable for an activity group or size class are compared to the ones from the previous survey period. Further validation is carried out at micro level, i.e. at the level of the individual enterprise. This includes e.g. comparison of the reported e-commerce figures with those reported previously. In both macro and micro level validation background information from Statistics Denmark's Statistical Business Register is used. Finally, in addition to this, checks involve identifying outliers, i.e. reported data with extreme values, for certain variables. In some cases validation results in recontacting the reporting enterprise for a clarification of the reported data.

3.5 Data compilation

The published results are raised to the level of the population. A stratified random sampling is used on the basis of the activity of the enterprise and the number of employees. By grossing up a reweighting and calibration using regression techniques is applied to the weight of the individual enterprise. Imputation is not used, neither in the case of partially lacking information in the individual record (item non-response), nor in the case of completely lacking reporting from an enterprise (unit non-response). The latter, instead, is handling through reweighting as part of the grossing up procedure.

3.6 Adjustment

No further corrections are undertaken than those already described under validation and treatment.

4 Relevance

The results are used by ministries, organizations, researchers and journalists etc., as a basis for political interventions, analyses, articles and research projects etc. A considerable number of variables are replaced each year as a result of the development in user needs and the need to measure new technology. The on-going development of the survey contents takes place in close dialogue with national stakeholders as well as in EU fora.

4.1 User Needs

In general there is substantial interest in the survey results from ministries, organizations, researchers and journalists etc. A considerable number of variables are replaced each year as a result of the development in user needs and the need to measure new technology. The on-going development of the survey contents takes place in close dialogue with national stakeholders as well as in EU forums. Dialogue with national stakeholders takes place, among other things, in Statistics Denmark's Contact Committee for the digital society (Kontaktudvalg for det digitale samfund).

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4.2 User Satisfaction

No user satisfaction survey has been carried out, but key users from ministries and organizations, as well as researchers and journalists, generally express great satisfaction with the quality and relevance of the survey results..

4.3 Data completeness rate

Requirements in regulation and guidelines are met.

5 Accuracy and reliability

The survey is sample based and consequently there is some uncertainty in the results in the form of random variation from the detailed branch and enterprise size. Every year uncertainty calculations are produced, and these show that the sampling uncertainty is limited.

The results are based on data from 3.926 enterprises from a total population of 15.999 enterprises. The overall response rate is 97,6 per cent.

5.1 Overall accuracy

Other uncertainty concerns unit and item non-response - both of which only to a limited extent affect the uncertainty of the survey results.

5.2 Sampling error

The results are based on data from 3.926 enterprises from a total population of 15.999 enterprises with 10 or more persons employed. The overall response rate is 97,6 per cent.

Every year uncertainty calculations are produced, and these show that the sampling uncertainty is limited. Examples of variables from the survey 2017, with estimated share and associated 95 percent confidence interval, lower and upper:

- Enterprises using cloud computing (total): 51 percent (53; 49)
- Enterprises with web-sales (total): 24 percent (23; 25)

Put differently, the above implies that the share of enterprises with web sale, with a probability of 95 per cent, is between the lower and upper share in brackets above, but that the estimated share in the statistics is the percentage prior to the brackets (24 percent).

Uncertainty is higher when breaking down by activity or size class. For both categorical and continuous variables, results for subgroups (main branch crossing with enterprise size) are published in the StatBank if the absolute uncertainty is below 7.5 percent associated by 95 percent confidence interval.

5.3 Non-sampling error

Other uncertainty relates to unit and item non-response, and this is in both cases limited in scale. The overall response rate is 97,6 per cent.

5.4 Quality management

Statistics Denmark follows the recommendations on organisation and management of quality given in the Code of Practice for European Statistics (CoP) and the implementation guidelines given in the Quality Assurance Framework of the European Statistical System (QAF). A Working Group on Quality and a central quality assurance function have been established to continuously carry through control of products and processes.

5.5 Quality assurance

Statistics Denmark follows the principles in the Code of Practice for European Statistics (CoP) and uses the Quality Assurance Framework of the European Statistical System (QAF) for the implementation of the principles. This involves continuous decentralized and central control of products and processes based on documentation following international standards. The central quality assurance function reports to the Working Group on Quality. Reports include suggestions for improvement that are assessed, decided and subsequently implemented.

5.6 Quality assessment

The population covers private enterprises with 10 or more persons employed. The population covers private, non-financial enterprises, excluding primary activities such as agriculture, forestry and fishing, mining and quarrying. The financial sector is only covered in the reference periods 2005 to 2010.

3.926 enterprises from a total population of 15.999 formed the sample for the survey of enterprises with 10 or more persons employed. The sample is stratified by activity and size class.

The response rate is 97,6 per cent. Non-response is due to bankruptcy, take-overs etc.

The survey is questionnaire based, and data is collected by digital reporting through http://www.virk.dk. Validation comprises macro and micro validation and some extent of recontact with enterprises. In the survey design, each observation will represent more elements in the population. The weights assigned to each observation are calcuated using generalising regression estimates.

5.7 Data revision - policy

Statistics Denmark revises published figures in accordance with the Revision Policy for Statistics Denmark. The common procedures and principles of the Revision Policy are for some statistics supplemented by a specific revision practice.

5.8 Data revision practice

Not relevant for this statistics.

6 Timeliness and punctuality

The statistics are published 7 months after the end of the reference period. No preliminary figures are published. Results are published in September, where the reference period is January (and, for some variables, the previous calendar year).

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6.1 Timeliness and time lag - final results

The statistics are published 7 months after the end of the reference period. No preliminary figures are published. Results are published in September, where the reference period is January (and, for some variables, the previous calendar year).

6.2 Punctuality

The statistics are usually published without delay in relation to the scheduled date. This also applies to data transmissions to Eurostat.

7 Comparability

The survey is harmonized with the EU model questionnaire, which is used in most member states.

7.1 Comparability - geographical

The survey is harmonized with the EU model questionnaire, which is used in most member states, and the results are therefore generally comparable.

7.2 Comparability over time

By comparisons over time, the following changes should be taken into account.

Enterprise size classes covered in the survey over time

- 2017: 10+ employees
- 2016: 5-9 and 10+
- 2004-: 10+ employees
- 2000-2002: 5+ employees
- 1999: 10+ employees
- 1998: 20+ employees

Notable changes in the industry coverage. The financial sector is only included in 2005-2010.

Weighting results: The published results in 1998 and 1999 were not raised to the total population at the publishing. Figures from 1999 have subsequently been raised for later publications.

7.3 Coherence - cross domain

Statistics Denmark also produces statistics on ICT expenditure in enterprises as well as the ICT usage by households and individuals.

7.4 Coherence - internal

A number of checks and validation mechanisms as well as reporting aides for the reporter's understanding of the questionnaire are built into the digital form. This includes among other things checks on sum totals of quantitative fields (e.g. that reported percentages add to 100 per cent) as well as filter and routing mechanisms (e.g. so that information cannot be reported in fields, where the enterprise should not provide any information).

8 Accessibility and clarity

News from Statistics Denmark and in the annual publications *it-anvendelse i virksomheder 2017* (December 2017) and *It-anvendelse i virksomheder - EU-sammenligninger 2017* (March 2018). See also tables ITAV1-ITAV6 in the StatBank.

The main results are available in Danish on Statistics Denmark's homepage at the address Statistics Denmark's homepage.

8.1 Release calendar

The publication date appears in the release calendar. The date is confirmed in the weeks before.

8.2 Release calendar access

The Release Calender can be accessed on our English website: Release Calender.

8.3 User access

Statistics are always published at 8:00 a.m. at the day announced in the release calendar. No one outside of Statistics Denmark can access the statistics before they are published.

8.4 News release

Most recent publications can be found at Most recent publications .

8.5 Publications

Results are published in the annual publications *it-anvendelse i virksomheder 2017* (December 2017) and *It-anvendelse i virksomheder - EU-sammenligninger 2017* (March 2018). The main results are available in Danish on Statistics Denmark's homepage at the address Statistics Denmark's homepage.

8.6 On-line database

Statbank.

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8.7 Micro-data access

The basic material (questionnaires and database) is stored for a number of years. Access to anonymised micro data may be granted under the rules for research access.

8.8 Other

Results are transmitted annually to Eurostat.

8.9 Confidentiality - policy

For a description of Statistics Denmark's policy on confidentiality, see (http://dst.dk/ext/formid/datafortrolighed).

8.10 Confidentiality - data treatment

In connection to publication and delivery of customized statistics, a so-called confidentiality test of data is made. The confidentiality test is made on the basis of two criteria:

1. The number criteria: If one data cell contains less than 3 observations (enterprises) employment and financial information can not be published
2. The dominance criteria: If one or two observations (enterprises) contained in one data cell, alone or together constitute a certain percentage of the total turnover of the cell, the turnover and other financial information for this group can not be published.

8.11 Documentation on methodology

More detailed documentation about the methodology is available in the annual report *It-anvendelse i virksomheder*.

8.12 Quality documentation

Results from the quality evaluation of products and selected processes are available in detail for each statistics and in summary reports for the Working Group on Quality.

9 Contact

The administrative placement of this statistics is in the division of Business Dynamics. The person responsible is Gitte Frej Knudsen, tel. +45 3917 3119, e-mail: gfk@dst.dk

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