

EC-learnings: How to Measure E-commerce?

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1. Introduction

Statistics on the Information Society is one of the most demanding and urgent challenges for the statistical community. The reason for the complexity of measuring this phenomenon is multiple. The Information and Communication Technology can be characterised as one of the major focal points of the economic and social development. Due to the pervasive character of the technology, it affects the way we organise the production in the enterprises, the content of the occupations, the relationship between different economic actors (enterprises, public sector and households), and the technology affects the way in which we organise our private life and use our time.

Thus, there exists a considerable political focus on how the Information Society as such develop, which factors are influencing the development and the economic and social impact of this development. A political debate about such fundamental economic and social factors in our society creates the needs for the establishment of official and reliable statistics in order to monitor the development and the different implications of the Information Society.

The Information Society is of global nature. It is not sufficient with statistical information at the national level, if one wants to analyse and understand the development of the society. In order to understand and put into perspective the national development, it is necessary to carry out international comparisons. And a condition for such benchmarking activities is the existence of internationally harmonised definitions and indicators.

As a consequence of the very strong element of internationalisation in the Information Society, Statistics Denmark has from the outset given high priority to the international co-operation in this field. Statistics Denmark has played an active part in the work carried out by international organisations as OECD, Eurostat and the Voorburg Group on Services Statistics. Statistics Denmark and the other Nordic statistical offices have established a working group on indicators on the Information Society working on establishing common definitions, indicators and survey methods.

Statistics Denmark started its statistical program for measuring the Information Society in 1998. The program gave first priority to statistics on the supply side, ie the ICT sector. This part of the program was mainly devoted to the elaboration of a definition of the ICT sector as the statistical information related to economic and employment variables could be derived from the existing sources by alternative aggregation of the existing activity classification without implying new statistical surveys. Second priority was given to the monitoring of the demand aspects, ie the usage of ICT in enterprises, households and public sector implying the development of new statistical surveys. The first survey on ICT usage in enterprises was launched 1998 as an annual survey, followed by quarterly surveys on ICT usage in households from 2001 and the first annual survey on ICT usage in the public sector shall be launched autumn 2001.

2. Definition of e-commerce

In the first year of surveying, e-commerce was not explicitly mentioned or defined in the questionnaire but measured by the following indicators related to business processes; *receipt of orders and ordering via the Internet*. In 1999, the following operational definition of e-commerce was introduced by Statistics Denmark and the other Nordic statistical institutes (SD 2000 b);

“Transactional electronic commerce is the sale of goods or services over the Internet, at any stage in the supply chain, whether between businesses, between businesses and consumers, or

between the public and private sectors. The sale is based upon on-line ordering, but ultimate delivery of the good or service may be conducted on or off-line.”

The definitions used put focus on the fact that the transaction implies decision about sales or purchases, i.e. a transfer of ownership or rights to use goods or services. It is the general opinion of the statistical institutes that it is feasible for the enterprises to detect the sales, based on ordering received via the Internet.

During 2000, OECDs Working Party on Indicators on the Information Society (WPIIS) has been elaborating a set of proposed definitions on e-commerce based on the experiences earned from the surveys carried out by the member states (OECD 2001 a):

E-commerce transactions	OECD definitions	PROPOSED operational definitions to be used in surveys (OECD Expert group on e-commerce, November 2000)
NARROW definition	An Internet transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over the Internet . The goods and services are ordered over the Internet, but the payment and the ultimate delivery of the good or service may be conducted on or off-line.	Internet Transactions. Orders received/placed on a Web page, over extranets and other applications that run over the Internet, such as EDI over the Internet, Minitel over the Internet, or over any other Web enabled application regardless of how the Web is accessed (e.g. through a mobile or a TV set, etc.). The payment and the ultimate delivery of the goods or services may be conducted on or off-line.
BROAD definition	An electronic transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over computer-mediated networks . The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off-line.	Electronic transactions. Includes all Internet transactions as defined above plus orders received/placed over EDI or any other online applications used in automated transactions (e.g. Minitel, interactive telephone systems). Orders received/placed using facsimile, telephone or <i>non-interactive e-mail</i> should not be included. The payment and the ultimate delivery of the goods or services may be conducted on or off-line.

The definition was discussed and approved slightly altered at the WPIIS meeting April 2001 – the exact wording not being available before deadline for submitting papers. Statistics Denmark's position is to keep the narrow definition in our survey, as we emphasize the *automation* aspects of e-commerce having impact on the business processes and their organisation, and thus excluding conventional e-mail interpreted as mainly fax or mail substitution.

3. Measurement of e-commerce: model questionnaire

The statistical offices of the Nordic countries were first to establish a project for a common set of guidelines for measuring ICT usage in enterprises. The guidelines were tested already in winter 1998/1999 by Statistics Denmark and Statistics Finland in a first round of surveying (SD 2000 a). Based on this exercise, it was decided to elaborate a proposal for a model questionnaire on usage of ICT in enterprises in close co-operation with the WPIIS and the Voorburg Group on Services Statistics.

The underlying idea behind the elaboration of a model questionnaire is the need for international comparable data. The model questionnaire is a data collection vehicle which can be used by national statistical offices in order to supplement the national results with another dimension - the possibility of comparing the national results with the statistical results of other countries on a comparable basis by using internationally agreed guidelines. The model consists of modules which can be used either in their totality or as separate modules in specific surveys.

The proposed model questionnaire on ICT usage in enterprises is based on the following principles (OECD 2001 b);

- the model questionnaire has been designed to be a flexible tool composed of modules allowing country specific features to be included

- the model questionnaire can be updated - and is expected to be - to reflect the rapid changes in IC technology or use
- the model questionnaire is designed as a general survey tool for all economic activities
- the core of the model questionnaire is based on a qualitative approach which is considered to provide the most harmonised basis for country comparisons.

Normally, questionnaires for statistical data collection are supposed to remain unchanged for longer periods, but this cannot be expected in the area of collecting information on ICT usage and e-commerce. This is a methodological challenge for the statistical institutes. On the one hand there is a need to update the questionnaire with relevant questions responding to user needs, and on the other hand there is a need to provide robust indicators allowing for time series analysis.

As the area of monitoring ICT usage is already crowded with private players, and as the questionnaire has been developed as a survey tool for non-mandatory surveys, the burden on respondents has been judged to be an issue of major importance. Thus, high priority has been given to construct a questionnaire that is easy to fill in. As a result, most of the questions are designed based on the principle of multiple choice and the extended use of tick mark boxes. Especially in a complex area such as Internet usage and e-commerce this was expected to have great impact on the response rate and the quality of the answers - also keeping in mind the purpose of international comparability. The relatively high response rates of the non-mandatory surveys (normally between 60 and 70 per cent) carried out by the Nordic statistical institutes support the chosen strategy.

The questionnaire has been formulated in a general fashion, i.e. it would in principle be applicable to any chosen activity in the private sector. Some countries have developed sector specific survey tools. For example, the United States has added questions on e-commerce transactions to the monthly Retail Sales Survey, or questions on ICT usage to the existing survey vehicle of the annual Manufacturing Survey. Due to the pervasive nature of ICTs, the idea behind the model survey is to design an economy wide survey tool which can also be used for sector specific surveys. The issues on the use of ICT in general, together with Internet and e-commerce in particular comprise the core of the questionnaire.

As a consequence of the above elaborated set of operational definitions, the questionnaire contains two modules on e-commerce transactions; namely Internet based e-commerce and e-commerce via EDI and other computer-mediated networks. The model questionnaire on ICT use in enterprises has been divided into five different modules;

- A: General information about ICT systems
- B: Use of Internet
- C: E-commerce via Internet
- D: E-commerce via Other computer-mediated networks
- E: Barriers on use of e-commerce, Internet and ICT in general

The model questionnaire is designed to feed the proposed core indicators on the usage of ICT in enterprises (OECD 2001 a), amongst others

- No/Proportion of businesses with access to the Internet
- Employment (level and share) of businesses with access to the Internet
- No/Proportion of businesses undertaking specific business processes on Internet
- No/Proportion of businesses with Web sites
- No/Proportion of businesses receiving orders over the Internet
- No/Proportion of businesses receiving orders over computer-mediated networks
- Value of orders of goods and services received over the Internet
- Value of orders of goods and services received over computer-mediated networks

4. Concluding remarks

The model questionnaire is mainly based on a qualitative approach to the information needs found in many countries. The proposed questions primarily focus on the usage of ICT as a tool, and constraints on

this usage, instead of asking for rapidly changing techniques deployed in the enterprises. The reasoning behind this approach is that it makes the questions valid for a (limited) number of years, allowing for compilation of time series.

But the convergence of ICT is a problem when measuring usage of ICT. As technology is rapidly changing, the readiness cannot only be measured by the number of PCs available in the enterprises. The module on infrastructure needs to be continuously revised. Also the borderline between Internet transactions and transactions conducted over other computer-mediated networks is difficult to maintain. EDI standards have developed into new forms that are converging towards Internet technologies, e.g. new EDI-formats and semiautomatic systems are based on www-forms.

It is obvious that a need to change the focus from measuring the 'readiness' to measuring the 'intensity' and 'impacts' of ICT usage shall occur within the coming years. An issue already raised for discussion is, whether the model should also include questions on the perceived benefits of using e-commerce. Another approach could be to measure impacts in a more indirect ways, by using other statistical registers in order to measure the link between firms' changes in productivity or competitiveness and ICT use. However, the impacts of e-commerce are rather complex causing major changes to businesses' internal organisation and supply chain. Therefore, at this stage, there is a certain hesitance to simplify this complex phenomenon by adding related questions in a survey vehicle such as the proposed one.

In the long run the main focus has to be on measuring the use of networks allowing the enterprises to connect to customers and suppliers and thereby automising business processes. As Internet transactions still are of a relatively small magnitude (in Denmark around 1 per cent of total turnover in the private sector (DS 2001)), it is not the volume justifying the resources put into the statistical measurement of e-commerce transactions, but the potential impact of the elements of automation on the organisation of businesses.

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RESUME

The paper presents the major achievements of the international statistical community regarding the statistical measurement of e-commerce. The paper presents the results of the work of statistical institutes since late nineties in developing and agreeing upon an internationally harmonised set of definitions, indicators and model questionnaire for measuring e-commerce by enterprises.