



# Economic and Social Council

Distr.: General  
12 April 2010

Original: English

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## Economic Commission for Europe

Conference of European Statisticians

### Group of Experts on National Accounts

#### Tenth session

Geneva, 26–29 April 2010

Item 9 of the provisional agenda

#### E-commerce

### E-commerce

#### Note by the Statistics Netherlands

##### *Summary*

International electronic commerce over the internet is expanding at a rapid rate and it imposes measurement challenges for official international trade statistics. Despite of that, there is still no commonly accepted definition for it. This paper presents definitional and conceptual issues related to the electronic commerce. In addition it discusses, with examples, the statistical challenges on measurement issues and the implications on different areas of national accounts.

## I. Introduction

1. International e-commerce, which involves cross border transactions over the internet, facilitates transaction of goods and services across boundaries and shows every sign of continuing to expand at a rapid rate. The potential cost savings from e-commerce are substantial. The most important cost saving aspect of e-commerce is the reduction of transaction costs. For instance, transactions over the computer network avoid many of the associated costs of exchange between buyers and sellers, including travel costs, administrative costs, communication costs and search costs.

2. While the growth of cross-border e-commerce is widely acknowledged, it imposes measurement challenges for official international trade statistics. In this chapter, we begin with definitional and conceptual issues related to e-commerce. E-commerce falls in two transactional categories: services and goods ordered and delivered via electronic means, and those, which are ordered electronically but delivered physically.

3. The treatment of e-commerce is still in the stage of definitional and conceptual problems. For instance, “electronic means” is a broad term that includes the internet but also a range of other computer-mediated networks. While some solutions are being sought to a provisional consensus on a definition, there is yet no internationally accepted definition of e-commerce.

4. This ambiguity translates itself into statistical challenges on measurement issues which provide the central discussion of this chapter. Before we discuss the implications on different areas of the national accounts (international trade, CPI, transportation margins, etc.), the economic rationale of why firms and consumers engage in e-commerce provides a useful introduction in scope and dynamics in which the economy is being affected.

5. In the annex of this chapter we provide an overview on data initiatives on e-commerce from the perspective of Statistics Netherlands where we focus our discussion on past, current and future efforts. This country experience (may be amended with other country experiences at a later stage) can be very useful in gaining further insights on the practical difficulties when compiling their national accounts.

## II. Definitions

6. The widespread use of electronic commerce has no commonly accepted definition. Domestic electronic commerce involves within border transactions through the internet or other external networks while international electronic commerce relates to cross border transactions. These transactions may refer to selling or buying goods and/or services which are then delivered on - or off-line. The transaction based concept that restricts e-commerce solely to “buying and selling” makes it distinct from other forms of e-business. E-business includes all aspects of on-line business activity – purchasing, selling, marketing of new ideas and products and services, handling logistics, support services, inventory management, etc. Therefore, international e-commerce, as a subset of the overall e-business can be generally defined as *any transactions that involves the on-line orders to buying and selling and results in the import or export of goods and services.*

7. A review of the relevant literature reveals that a definition of international (and domestic) e-commerce varies because of three major issues. The first issue is that the *framework* in which e-commerce operates matters. In academic literature e-commerce is very broadly defined and is referred to as an activity that is part of more general ICT activities because their focus is primarily aimed at investigating its impact on industrial

organization, efficiency and productivity growth. This is also true for policymakers who employ broad definitions that emphasize the impact of e-commerce on all aspects of the economy. At other times, narrower definitions are used to address more specific policy areas such as intellectual property rights, taxation and trade.

8. The second issue is that the *type* of e-commerce matters. E-commerce (national or international) can be grouped into different categories. The most common are: business-to-business (B-to-B), business-to-consumer (B-to-C) and consumer-to-consumer (C-to-C) commerce. B-to-B commerce includes a broad range of inter-company transactions, including wholesale trade as well as trade in intermediate goods and services (examples include, manufacturing parts and components, technology, services, resources). Also, financial transactions may be included such as insurance, commercial credit and other financial assets (Lucking-Reiley and Spulber, 2001). B-to-C commerce comprises a market of e-commerce whereby firms sell goods and services to consumers defined as natural persons or households. There is a general agreement that the size of B-to-B is larger than the size of B-to-C (for instance, Fraumeni, 2001; CBS, 2009), however, the B-to-C sector experiences a very rapid growth. Two important reasons that explain such a rapid growth are the increasing usage and access of the internet and the emergence of specialized online shops. The third category of C-to-C commerce relates to the selling of goods and services among consumers (persons and households). In this market, specialized e-commerce firms (e.g., e-Bay, Amazon) act as intermediaries that enables transaction among consumers of new and used goods and services. Advertising revenues, including charges to have a link appear on web page, represent an important source of revenue. While each of these different categories much relates to a typology of buyers and sellers, these will have a major impact on data availability, measurement, as well as implications on national accounts. We come back to this issue in section 4.

9. According to the general definition used, e-commerce means that orders are done over the internet. However, depending on how “internet” is defined two further definitions may be used. More specifically, definitions vary mainly with respect to whether e-commerce refers only to selling and buying through the internet or also through other electronic networks such as electronic data interchange<sup>1</sup> (EDI), intranet and extranet<sup>2</sup>.

10. In table 1, we illustrate some of the definitions of electronic commerce that have been employed by some private and public entities. The table highlights various definitions of electronic commerce based on more or less specific terminology of public versus closed computer-mediated networks. A first concern is that, when implemented statistically, estimates on e-commerce may be difficult to evaluate. For instance, Fraumeni (2001) shows numerically that the range of the highest and lowest estimates of B-to-B and B-to-C commerce varies with an average factor of seven. Another concern for these considerable discrepancies among e-commerce estimates is that without a clear understanding of definitions employed, it is practically impossible to compare indicators internationally.

<sup>1</sup> EDI allows direct communication of standardized trading messages between computer systems. Before internet, EDI systems were primarily used by large businesses and were strictly proprietary (conducted over private networks); with the emergence of internet, some EDI systems were transformed into open networks.

<sup>2</sup> Intranet computer networks allows for communication solely among an enterprise’s employees while extranet is part of intranet that is also accessible to selected users outside the enterprise such as vendors and clients. Other technology that could be part of a computer mediated network are enterprise resource planning (ERP) and customer relationship management (CRM). ERP concerns software that integrates data on planning, purchase , logistic and production activities. CRM is especially oriented towards sharing information on sales and marketing data.

11. Consequently, in 1999, the OECD decided to set up an international working group to compile a definition of e-commerce that could be used in policymaking and that was statistically reliable and feasible. As table 1 shows, the working group compiled two definitions of e-commerce with the following dimensions: the network used for e-commerce, and the business processes related to e-commerce. The 'broad' definition concerns the purchase and sale of goods or services via computer networks. This broad definition describes overall electronic transactions. The 'narrow' definition only deviates in one aspect: the network used to order the goods and services is the internet.

Table 1  
**Definition of Electronic Commerce**

Defining Source	Definition
Organization for Economic Cooperation and Development	<u>Broad</u> : the sale or purchase of goods and services conducted over computer-mediated networks; includes EDI; excludes intranet transactions <u>Narrow</u> : the sale or purchase of goods and services conducted over the internet; includes Web-enabled EDI and any other Web-enabled application; excludes intranet transactions
U.S. Census Bureau	The value of any monetary transaction completed over a computer-mediated network that involves the transfer of ownership or rights to use goods and services; includes internet, Intranet, Extranet, and EDI transactions <sup>b</sup> .
UNCTAD	Sale or purchase/procurement of goods or services; electronic data interchange (EDI); mobile commerce; integration of ordering system with that of customers/suppliers; integrated invoicing and payment by customers; full integration with back-end systems; use of an extranet; secure transactions; automated payment of suppliers <sup>d</sup>
Boston Consulting Group	Internet and EDI based transactions <sup>a</sup>
Forrester Research	Trade of goods and services in which the final order is placed over the internet; excludes EDI <sup>a</sup>

Sources: U.S. Bureau of the Census<sup>b</sup>, OECD<sup>c</sup>, aGAO (2002), dUNCTAD

12. This OECD working definition of e-commerce is now widely used among OECD countries<sup>3</sup> and some developing countries. However, with the progress made on conceptual and methodological issues, coupled with the experiences collected from the surveys, a rethinking of the definition has been required (e.g. on issues such as whether to include email or e-deliveries). Already, some non-OECD countries are using their own definitions of e-commerce.

13. The broader but more inclusive definition includes proprietary networks used, such as EDI. This raises two shortcomings. First, in countries where e-commerce has already been a regular feature of business activities for many years, for example in the United States and Europe, this definition may be more relevant for capturing the full scope of such activities. However, taking into account differences in terms of the technological endowment across countries, the broader definition may be less relevant to smaller and less developed economies where the major network involved is the Internet. For instance, Stare (2001) notes that in order to stimulate the diffusion of e-commerce in Central and Eastern countries, one of the solutions are improvements in the overall telecommunication

<sup>3</sup> Countries that have applied these definitions include, Australia, the US, Japan, Scandinavian countries and Eurostat in data collection across its member states.

infrastructure and internet access services. For these cases, the narrower (internet) definition, which is deliberately a subset of the broad definition, could be more applicable.

14. Second, computer mediated networks is an unambiguous definition that is prone to ongoing and rapid technological change. As a result, new inventions translate into the re-thinking of future definitions. For instance, a cost attractive feature of open source software for web servers and web browsers (e.g., Apache, Linux, Firefox) is that everyone may develop or improve current software versions because source codes of the software are publicly made available.

15. In order to accommodate countries' and/or users' different environments and practices, an international OECD working group started, in 2009, to work on a definition of e-commerce in which this distinction between a broad and a narrow definition is revised. The outcome of the working group is a proposal for a new definition that solves some of the shortcomings previously stated.

16. More specifically, a OECD (2010) new proposed definition relates "...to the sale or purchase of goods and services conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods and services do not have to be conducted online...". The new definition includes EDI and extranet and excludes intranet transactions. Similar to earlier definitions online payment and delivery are no prerequisites for e-commerce. One of the major changes of this new proposal is that it is no longer based on a narrow-broad definitional system. Indeed, the new term "computer networks" no longer includes the networks distinction between internet and other e-commerce related electronic transactions. The underlying rationale of this new definition is that information can now be collected on the basis of either transaction mode.

17. The OECD task force proposes that the specific transaction mode is captured in form of a new questionnaire where respondents are given the choice between: web sales, web purchases, EDI-sales, EDI-purchases, potential other types of e-commerce. Prior to response, each of these of these e-commerce transaction models are defined. Evidence suggests that this solves many of the difficulties related to the non-response of supplying data information (OECD, 2010).

### **III. Economic rationale of E-Commerce**

18. E-commerce can be considered as a process that mediates transactions (trade) of selling goods and services through electronic exchange. It is widely accepted that e-commerce improves efficiency due to (i) cost reductions, (ii) more competition and (iii) a better reorganization of production processes. We discuss each of these mechanisms in turn. The electronic automation of transactions through the internet avoids many of the operating costs related to the process of a purchasing order. Lucking-Reiley and Spulber (2001) discusses the pre -, during - and post transaction situation whereby e-commerce innovation can be cost advantageous. Before such transactions, internet technology reduces the costs of searching for suppliers and buyers and making price and product comparisons. During the transaction, e-commerce reduces the cost of communicating transaction details by avoiding many of the associated costs of interpersonal exchange (for instance, travel costs, paper processing, etc.). After the transaction, e-commerce lowers the costs of monitoring the contractual performance and in addition, inventory and supply management can easily be updated through automation. While empirical evidence of these potential cost savings is limited, it is estimated that, depending on the industry, such cost reductions lie in between a factor of 5 and 10 (Lucking-Reiley and Spulber; 2001) and range between 2 to 80 percent of total input costs (OECD, 2000; Garicano and Kaplan, 2001).

19. In order to assess the extent by which such estimated savings may vary across industries, table 1 in the appendix shows some evidence of automated supply chain management (SCM) from an ICT survey conducted by Statistics Netherlands.<sup>4</sup> According to the survey, two types of automation are considered: SCM through the internet and SCM through automated data exchange (ADE).<sup>5</sup> The table shows that, at the end of 2008, about 13 percent of firms in the Netherlands used any form of automated SCM. Differences between the smallest and largest firms are substantial: respectively, 10 en 41 percent. This finding is consistent with the view that larger firms face higher transaction costs (per unit variable costs), and thereby realize more value from e-commerce because it helps to reduce transaction costs. Generally, automated SCM is more frequently used in industry than in services with the exception of IT and communication. Differences between ADE and the internet are minor: in 2008, 8 percent of the firms used the internet while 5 percent used the ADE.

20. Cost advantages, as a result of the automation of transactions, may translate itself in lower prices which in turn may benefit consumers. According to a Goldman and Sachs (2000) study, it was estimated that an economy wide price reduction of 4% could be attained, although such estimates depend on numerous assumptions. In a more elaborated study, Garicano and Kaplan (2001) estimates that in the wholesale used car auction market, e-commerce reduces transaction costs with 80% which accounts for about 5% of the commercial value. As a result, it is estimated that these cost differentials have translated itself into a reduction of 2% of the automobile value.

21. A second potential benefit of e-commerce is a stimulus towards a more competitive environment. By definition, a benefit of lowering prices (through lowering costs) that is being passed along to consumers does not necessarily increase the level of competition within a certain market. In such a situation, a firm's profitability would be kept constant. These ambiguous effects are consistent with empirical observations by Hitt and Brynjolfsson (1996) and Humphrey (1994). Hitt and Brynjolfsson use firm level data on IT spending by 370 large firms. The evidence shows that the adoption of the internet did not result in higher profitability. Similar evidence is found in banking industry with the introduction of ATMs (see Humphrey, 1994). Indeed, ATMs have helped to reduce the transaction costs by 15 percent. At the same time, transaction volumes more than doubled and the benefits went to all consumers. While the ATM does not add any additional value to banks, the study concludes that it is rather related to a strategic necessity in the banking sector.<sup>6</sup>

22. However in a situation where prices would be kept constant (when a firm adopt the automation of transaction), higher price cost margins manifests itself into lower competition and higher profits. So far the empirical evidence is mixed, with some work suggesting lower, constant or even higher prices (see Visser and Lanzendorf, 2003; OECD, 2000, for a review of some of the empirical literature).<sup>7</sup> The underlying reason is that other

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<sup>4</sup> Another way of assessing the cost impact of e-commerce internationally is to look at percentage of intermediate inputs from sectors that are strongly affected by e-commerce.

<sup>5</sup> It is noted that the costs of integrating ADE are higher than through the use of websites. SCM is a process that relates all activities from input supplier, wholesale distributors to the final user.

<sup>6</sup> However, an additional argument not explored in the paper, is that the large volume of ATM transactions despite constant profits may reflect a firm's strategy to increase market share.

<sup>7</sup> It is evident that transactions and cost reductions are likely to be different for various types of products. The OECD (2001) reviews some work with specific reference on B-to-C commerce. In some studies, it is estimated that digitized products (e.g., CD ROM's, books, airline tickets) tend to be on average 10 percent lower compared to conventional retail sales. Whether these cost advantages translate itself into consumer advantages is not investigated.

factors, although still subject to debate, may also be important. For example, Schmitz and Laser (2002) question the widely held view that B-to-C commerce markets are characterized by a high intensity of competition, using a combination of theoretical arguments and empirical evidence. The authors argue that the goods sold in B-to-C e-commerce have to be interpreted as heterogeneous 'composite goods', that market transparency in B-to-C e-commerce is lower than widely assumed, and that high endogenous sunk costs limit the intensity of competition in B-to-C e-commerce.

23. A third mechanism specifies the efficiency impact of B-to-B commerce through a better reorganization of production processes. Because e-commerce may reduce transaction costs, as discussed above, this may lead firms to take advantage of adjusting their organizational structure of their production network or supply chain. As shown in the literature, the adoption of B-to-B commerce increases the incentives of firms to substitute many of their production and service related activities through vertical integration and outsourcing (Lucking-Reiley and Spuller, 2001; Zhu et al., 2006). One additional factor that further stimulates such motivation to outsource is the firm globalization (Kraemer et al. 2002). Indeed, empirical evidence (cross-country: Kraemer et al. 2002) suggests that firms engaged in foreign activities, have higher incentives to adopt e-commerce to help improve the integration of the value chain.

24. While the discussion in the previous paragraph is especially true for B-to-B commerce with transactions of intermediate inputs, one can also question whether the globalization aspect is also relevant for transaction in end products and services (B-to-C commerce). There is a more general theoretical basis that downstream activities such as marketing, sales and customer service are more locally dependent. With specific reference to B-to-C commerce, some empirical findings reinforce this prediction. For instance, Globerman et al. (2001) confirm that globalization is an important determinant for B-to-B commerce in the retail brokerage industry while B-to-C is rather a driver to enhance a local competitive advantage. In a more elaborated study, Kraemer et al. (2002) found similar evidence across countries and multiple industries. These results must be taken with some caution since much depends on the type of products. For more generic products such as electronics, software, clothing, books, music, supply and demand is rather cost driven than adjusted to local taste and habits.

25. To sum up, in this section we have discussed, amongst others, three factors by which e-commerce improves efficiency: cost reductions, more competition and a better reorganization of production processes. For the purpose of this chapter, we limited the discussion to these topics since the general literature regard these as the most essential ones. Nevertheless, it does not rule out that other interesting avenues of rather on some indirect effects of e-commerce could be explored. Examples include the impact of B-to-C commerce on consumption patterns, the reallocation of labor through the impact of B-to-B commerce, and macroeconomic implications.

#### **IV. Statistical Treatment in International Standards**

26. At this moment, the statistical guidance on e-commerce in international manuals is very limited. As will be explained in the next section, there is yet no consensus on how to treat international electronic supply of products. However, solutions are being sought, rather with a provisional character, and it seems more likely that such trade will be treated as international e-commerce in services.

27. The treatment of e-commerce transaction within the framework of the 6th edition of the IMF's Balance of Payments and International Investment Position Manual (BPM6) falls in two categories (see paragraph 10.10): services and goods ordered and delivered via

electronic means, and those, which are ordered electronically but delivered physically. When deliveries are made off-line, the usual statistical treatment is applied to goods and services and shipping charges are allocated in line with FOB valuation principle. In case of electronic delivery, “in general, charges for electronic delivered products (goods and services) are included in services ...” whereas “financial services associated with e-commerce are included in financial services”. The definition of goods and services in the BPM6 are in line with the 2008 SNA treatment of goods and service accounts.

28. In parallel with e-commerce, the discussion on telecommunication and computer services tend to be more elaborated in the BPM6 (see chapter 7) focusing on classification and in some instance, mode of supply issues. Transactions of digitized products directly related to e-commerce are treated as services. The draft annex to the manual on E-commerce and International Trade in Services has proposed a simplified approach to allocating electronic products to EBOP components. While the allocation is merely based on functional characteristics of the traded service, no clear distinction is made between the physical characteristic (for instance, digitized such as e-books) and the mode of delivery (e.g. electronically).

29. There is a general recognition that the electronic delivery of international e-commerce services is covered by General Agreement on Trade in Services (GATS), yet there is still no agreement on the modes of supply. Although, a provisional but unresolved solution is to consider mode 1 – cross border trade, or mode 2 – consumption abroad. The alignment of e-commerce between the modes of supply is that the supplier is not present within the territory of the consumer but in mode 1 the service is delivered within the territory of the consumer while in mode 2 it is delivered outside. In the context of BOP the residence of the supplier is the most relevant criterion but because the geographical information of the supplier is, in many cases unknown, a clear distinction is unclear.

30. It is also noted that in the BPM Working Group, the task force on the RoW was revived by the Committee on Monetary, Financial and Balance of payment statistics (CMFB) in order to support further work on the reconciliation of the BoP and the RoW account at national level. With particular reference to e-commerce, some further work was recommended on the “assessment of the recording of e-commerce. “Information from credit card operations will be highly valuable for the assessment of transactions, in particular at high frequency, notably for travel and e-commerce”.

## **V. Measurement**

31. Considering that e-commerce will play an important role in transforming the economy, the extent to which international trade is likely affected by international e-commerce much depends on how it is recorded in data. In the appendix we describe some data initiatives of Statistics Netherlands. But before doing so, it is worthwhile to discuss some e-commerce measurement challenges. In addition, we also include a discussion on how e-commerce related activities are integrated in the national accounts. While e-commerce facilitates imports and exports, we put special emphasis on some issues and measurement challenges related to recording international trade statistics.

### **A. Classification, Identification and Coverage**

32. While efforts towards a more concise definition of e-commerce are sought, the treatment in the context of classifying the delivered goods versus services remains a statistical challenge. While the purchase order, including the search for the product or service, must be performed electronically for many products it is only for services and



digital goods that delivery is made online. The issue of classification on whether such type of delivered goods should be treated as actual goods, services or something else remains a challenging issue to resolve. This issue affects domestic as well as cross-border measurement.

33. While the measurement of output in services has always been problematic (because of the identification of a standard product), with e-commerce these measurement challenges will even be aggravated since it has even increased the importance of services (see table 2-4, in the appendix, for an example of the Netherlands). Service industries that have been affected by e-commerce include transport & storage, IT, insurances, and other business services. Examples of e-commerce activities in these industries include on-line payments for travel arrangements (hotel and travel), insurance purchases, software and other related services. In the case of IT-products it is difficult to measure the output of software directly as well as related IT services which in turn may also affect the output of hardware. One notable outcome is an unusual high percentage of e-commerce turnover in total turnover in the transportation and storage industry (see table 2). It is noted that this industry includes airlines that realize their e-commerce sales through on-line bookings. By means to further exemplify the airline industry, a question is what happens when an airline ticket is delivered through electronically? Should it be recorded as a good or a service? Although, one might argue that the on-line delivery of an airline ticket is the same than a physical delivered ticket, the implications for data collection will be affected. A general tendency in these discussions is that differences exist in the practicability and quality of digitized substitutes of physical goods/services, such as, software, CD ROMS, books, etc.

#### **1. International E-Commerce**

34. Discussions on digitized goods with physical counterparts (examples include, newspapers, e-books, airline tickets, etc.) and the issue of distinguishing between goods and services are crucial for international trade data collection purposes.<sup>8</sup> While this definitional dilemma still remains an issue, there is a general agreement that the cross-border supply of digitalized products should be seen as a service which, for instance, permits the consumer to make use of the digital information. That is, there is only the use of service/information to make a product. This discussion is further fueled in trade debates at the multilateral level by which economic and sovereignty interest play an important role. From a service perspective, custom duties do not apply under GATS rules. From the goods perspective, custom duties are subject to GATT rules. A clearer position is that products ordered and paid for through the internet, but delivered physically, should be considered as goods, thus falling within the scope of the GATT rules.

35. This latter form of e-commerce is generally included in the statistics on merchandise trade. However, the e-commerce type of trade can't be identified because the method of ordering the good is not recorded. Therefore, e-commerce is to a certain extent included in international trade statistics but can't be identified as e-commerce trade. However, gaps exist in international trade statistics in the case of electronically delivered goods because destination of supplier and the internet host may be uncertain.

36. Below, we briefly some additional problems related to e-commerce trade:

- Low-export values – the value of transaction below threshold values may, with the increasing trend of international e-commerce, aggravate the problem of undercounting. The undercounting problem of low-value transactions is especially

<sup>8</sup> See Ruffles (2001) and Kuhn (2001).

inherited to B-to-C commerce because of the increase in one-time low-valued purchases.

- Underreported transaction – international e-commerce leads to an increase of many small-scale services which may fall below the threshold value requirements set by statistical data reporting systems.
- New services – e-commerce is merely another channel to reach customers with new services. This may have an important influence on current trade streams and involve the fall of current trade statistics if not included in surveys. This may be particular true for B-to-B commerce which comprises the largest trading value.
- Residents – online purchases within the EU are not recorded as international transactions in Intrastat; online purchases from the rest-of-the-world are counted when it exceeds a threshold value and there is physical delivery.

## **B. Additional Data Challenges**

37. E-commerce has the potential to understate the exports of goods and services which in turn affects the accuracy of GDP estimates. However, other national accounting entities may be affected as well. In this section, we focus on some additional implications of e-commerce.

### **1. Retail turnover index**

38. Statistics Netherlands measures spending by households in its monthly statistics on consumption expenditure. Part of this expenditure takes place in retail outlets. In its monthly statistics on retail trade, Statistics Netherlands monitors sales by various retail sectors. Both statistics therefore give a picture of spending by households: one from the point of view of the consumer, the other from the point of view of the seller. The monthly statistics on retail trade, the retail turnover index, are also an important source for the monthly statistics on consumption expenditure. Furthermore, monthly data on retail turnover provides an indicator of quarterly household consumption in national accounts, which is the largest element of expenditure.

39. As a result of international e-commerce, there might be some discrepancies between retail consumption expenditure within national border and the gross retail sales. The gross retail sales is not only generated by firms recorded in the business registers, which serves as the population base for the calculation of the index, but also through foreign firms (which may have domestic VAT registration) but are not included in the registration.

40. This problem has been communicated among several statistical agencies. With specific reference to the STS regulation, the scope of turnover indices does not take into account domestic sales when the invoice is issued from abroad; although, it includes exports from the domestic country (non-domestic orders). Non-domestic orders are distinguished between the euro-zone and non-euro-zone. This distinction only concerns industry (appendix A in the STS regulation); retail trade (annex C) and other services (annex D) do not require this distinction.

41. Because the emergence of small retail trade e-commerce services of electronically delivered products (media products, e-books, etc.), with domestic and foreign turnover, this will hamper an appropriate indicator for household consumption if, as recommended, the distinction between domestic and non-domestic market is not made. However, as noted before the international classification of e-commerce as services remains an unsolved issue. It may well be so that instead e-commerce might be picked up by special designed category in surveys.

42. The same problem occurs with the calculation of output prices (for the calculation of PPI's). The STS-Regulation does not require the calculation of PPI for non-domestic prices in case of retailing and other services. The effect of e-commerce will only enter the index are those that arose from transactions in the domestic territory. For industrial goods (industry, Annex A) many of the efficiencies (e.g., faster and cheaper delivery), and quality changes, due to electronic foreign transactions, will be captured in the non-domestic-price indices as reflected by lower transaction costs and higher efficiency. Although, the STS-regulations do not require input prices for Annex A products, for some products input prices can also be considered as producer prices.

## 2. CPI index

43. In the previous section we highlighted some of the implications of e-commerce on the PPI. In this section the nature of the potential bias in the CPI index arising from e-commerce activities is discussed. The CPI reflects prices of goods and services which an average household bought for the purposes of consumption such as, shopping items, spending on durable consumer goods such as washing machines and cars, rent, school and tuition fees and consumption-related taxes such as property tax and motor vehicle tax. Most of the prices are collected from retail outlets.

44. The impact of e-commerce products on the calculation of the CPI depends on various factors. The magnitude of this effect not only depends on the weight of e-commerce spending in total consumer expenditure but also on the type of retail goods sold on-line. As an illustration for the Netherlands in 2009, e-commerce by private households was estimated at almost €6 billion, more than a 50% rise from 2007 (data source: Thuiswinkel Markt Monitor, see CBS, 2009). This amounts to about 2-3% of total expenditure per household (own calculation). Table 4 in the appendix gives an overview of some of the products that are purchased online.

45. The question whether internet trade is sufficiently important to be included in the CPI requires more exercise. The idea that e-commerce leads to lower prices still remain an empirical ambiguity (see discussion in section 3) however numerous factors point to this direction. With specific reference to the Netherlands, it is found that about 50% of the respondents find the price advantage vis-à-vis traditional retail prices an important determinant for on-line purchases (CBS, 2009). In addition, the wide range of products and services that are made available online from foreign internet sites may generate a higher purchasing parity through VAT and exchange rate differences.

46. From a more general perspective, CPI index compilers recognize the ongoing methodological challenge of problems dealing with the introduction of new and modified goods/services (substitution bias, quality change bias, new goods bias) and the emergence of new retailers (outlet substitution bias). The above discussion certainly fuels many arguments based on the dynamic features of e-commerce which makes it prone to CPI measurement bias. Some examples include: e-commerce allows consumers to switch from traditional outlets directly towards wholesalers and internet firms; wider availability of used goods and services through C-to-C commerce and auction sales, introduction of new goods from abroad (especially for electronic products, e.g., iPhone, Microsoft Zune).

47. It may well be that the emergence of e-commerce related services and goods translate themselves into lower retailing prices of substitutes that are already included fixed basket. As such, the measuring price change of goods and services in e-commerce domains are not necessarily. However, some evidence suggests differences in price volatility. A pilot study conducted by Finkel and Yiftach (CBS, 2003) points out that prices on the internet market are more volatile than the retailing market for a similar basket of goods. In addition, Brynjolfsson and Smith (2000) find that the price dispersion is higher among tradition retail outlets.

48. An analysis of price trends from e-commerce goods and services in comparison to price trends of traditional outlets of the same goods and services would reveal more insights to the inclusion in the current CPI. The construction of a survey population on the number and type of goods and services, the household structure and expenditure weights is methodological possible. Data identification on reliable price information on new goods, the quality adjustment of e-commerce and especially the C-to-C and auction sales must be taken into consideration.

### 3. Other Issues

49. All businesses are classified according to the NACE code system, the European standard for industry classifications. To account for technological evolution and structural changes of the economy, a new 2008 version is introduced based on the International Standard Industrial Classification of all economic activities (ISIC) of the United Nations. Since e-commerce pervades in almost the entire economy, it is not an activity that can be found in a single industry. Some industries are, however more prone to e-commerce than others. For example, in the new NACE a category is made for 'web portals' (code 6312) and 'retail sale via mail order houses or via internet' (code 4791, previously only retail sale via mail order houses). Statistical data on these industries may provide an indication of e-commerce developments. However, more data on e-commerce is needed also in different industries to draw conclusions for the entire economy.

50. In the Dutch national accounts there is currently no distinction between the part of gross domestic product (GDP) that is generated by e-commerce and the part that is generated by other sales channels. Apparently, such a distinction is difficult or even impossible to make. The absence of statistical information on e-commerce however, may lead to a bias in estimations of GDP and economic growth. For example, the online purchases of music downloads from foreign websites should be part of household consumption and may lead to a downward bias of GDP if it is not covered in the statistics.

51. The majority of value-added that can be attributed to e-commerce is probably captured within the national accounts. Online purchases as well as online sales by domestic companies are all reported in the overall purchases and sales of domestic companies in the production statistics. This means that all business-to-business transactions of domestic companies that are placed online are covered in the national accounts (although a distinction between online transactions and other transactions can't be made). In addition, all online business-to consumer transactions from domestic firms to domestic or foreign consumers are picked up by the statistics, as they are recorded as part of sales by domestic firms. However, some purchases by domestic consumers from foreign websites may be missing in the statistics as they are not recorded.

52. In the Statistics Netherlands' survey ICT-households, the B-to-C is observed through questions related to the frequency and size of internet purchases. However, no distinction is made between domestic and foreign purchases which makes it impossible to calculate the total volume of B-to-C market. The absence of data on international online trade may lead to an incomplete view of macro-economic variables such as import and household consumption. It is therefore necessary that these flows are shown correctly in international trade statistics and that supplementary estimates are made for the national accounts.

53. An additional category of e-commerce is composed of consumer-to-consumer transactions. In the Netherlands a large amount of online trade consists of (second-hand) trade between consumers. For example, the total value of transactions on marktplaats.nl (a Dutch online marketplace for consumers) amounted to 4.7 billion Euro in 2006. This was almost twice as much as the estimated amount of online sales by Dutch web shops in 2006 (2.8 billion Euro). The transfer of goods between consumers does not contribute to GDP

however, as it is not part of household consumption. On the other hand, the fees and commission paid by consumers to the companies that facilitate the sale and purchase of goods are part of household consumption. Therefore, the services of these companies should be recorded in the national accounts. If these companies are domestic, their revenues are picked up by regular statistics. But, if these firms are located in foreign countries (e.g., ebay.com) supplementary estimations for household consumption should be made.

54. Furthermore, from a national accounting perspective on households, an interesting avenue is to look at the implications of the adoption of e-commerce on household mobility and the transportation sector that deal with home delivery. For example, in a recent study Visser and Lanzendorf (2003) explore these effects by means of a literature review. It is generally concluded that B-to-C commerce result into an overall increase of both the individual travel and freight transport. The increase of freight transport can be easily explained by the increase of home delivery. On the other hand, the increase of household mobility is due to a higher demand for non-shopping purposes.

## VI. Concluding Remarks

55. This chapter discusses the definitional and conceptual issues related to e-commerce. Because there is no commonly accepted definition of e-commerce. To limit this ambiguity, the OECD has proposed a new definition which has the potential to solve many of the difficulties related to the functionality and supply of data information. The statistical challenges on measurement issues and implications on different areas of national accounts (international trade, CPI, PPI, transportation margins) are also discussed.

56. E-commerce under form of products ordered and paid through the internet poses challenges when it is aligned to the transaction mode of physical versus electronic delivery. At this moment, the statistical guidelines on e-commerce in international manuals are very limited. Regarding classification, the focus has been more on the set of products that are delivered electronically however some work remains to be done in classifying these e-commerce products and services more explicitly. If an e-commerce or some variant is established in the ISIC then consideration should also be given at least to a corresponding division in the EBOP with clear distinction between physical and electronic delivery. Furthermore, in line with current proposals, information from credit card operations will be highly valuable for the assessment of e-commerce transactions.

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## Annex I

Table 1  
Supply Chain Management (SCM), 2008<sup>1)</sup>

	Applies some kind of SCM	Method used	
	-	SCM via websites	SCM via Automated data exchange
-			
	<i>% of the total number of companies</i>		
	-		
Total	13	8	5
<i>Sector of industry (SIC 2008)</i>			
Manufacturing	15	9	6
Electricity and gas supply; water supply; waste management	11	7	7
Construction	8	5	1
Wholesale and retail trade; repair of motor vehicles and motorcycles	21	12	11
Transportation and storage	13	10	9
Accommodation and food service activities	7	6	1
Information and communication	15	13	7
Financial institutions	9	8	7
Renting, buying and selling of real estate	6	4	2
Consultancy, research and other specialised business services	8	6	3
Renting and leasing of tangible goods and other business support services	7	5	2
Human health and social work activities	5	3	3
<i>Company size</i>			
10-19 employees	10	7	2
20-49 employees	12	7	6
50-99 employees	14	9	8
100-249 employees	24	15	14
250-499 employees	34	22	22
500 and more employees	41	31	29

<sup>1)</sup> Companies with ten and more employees.

Source: Statistics Netherlands, ICT use by enterprises 2008.

Table 2  
**Turnover e-commerce, by sector of industry (SIC 2008) and company size, 2008<sup>1)</sup>**

	<i>2008</i>
	<i>% of total turnover</i>
10-19 employees	6.9
20-49 employees	7.9
50-99 employees	10.8
100-249 employees	13.0
250-499 employees	12.6
500 and more employees	14.1
<i>Company size</i>	
Construction	2.26
Electricity and gas supply; water supply; waste management	3
Renting, buying and selling of real estate <sup>3)</sup>	5.12
Consultancy, research and other specialised business services <sup>3)</sup>	5.12
Human health and social work activities	5.23
Renting and leasing of tangible goods and other business support services	7.38
Information and communication	7.75
Accommodation and food service activities	9.7
Wholesale and retail trade; repair of motor vehicles and motorcycles	13.84
Manufacturing	14.81
Transportation and storage	24.54
<i>Sector of industry (SIC 2008)<sup>2)</sup></i>	
Total	11.61

<sup>1)</sup> Companies with ten and more employees.

<sup>2)</sup> Excluding financial institutions.

<sup>3)</sup> 'Renting, buying and selling of real estate' and 'Consultancy, research and other specialised business services' are taken together.

Source: Statistics Netherlands, ICT use by enterprises 2008.



Table 3  
**Electronic sales: most intensively adopting sectors of industry, and by company size, 2008<sup>1)</sup>**

-	
<i>% of the total number of companies</i>	
Total	25
<i>Sector of industry (SIC 2008)<sup>2)3)</sup></i>	
Accommodation	66
Travel agencies, reservation services and tour operators	65
Insurance	57
Wholesale	46
Information and communication	45
Renting of real estate	40
<i>Company size</i>	
10-19 employees	23
20-49 employees	27
50-99 employees	30
100-249 employees	32
250-499 employees	33
500 and more employees	36

-  
<sup>1)</sup> Companies with ten and more employees.

<sup>2)</sup> Only sectors of industry with a high share of companies with electronic sales are listed.

<sup>3)</sup> In this table, the sectors of industry included a more detailed level than the other figures in this chapter.

Source: Statistics Netherlands, ICT use by enterprises 2008.

Table 4  
**Online purchases by type, 2005-2009<sup>1)</sup>**

	2005	2006	2007	2008	2009
Lottery or gambling	2	5	5	5	8
Groceries, cosmetics and cleaning products	4	5	9	8	9
Other purchases	6	4	4	4	11
Hardware	11	14	13	14	13
Shares, financial services, insurance	5	11	11	10	15
Household items <sup>2)</sup>	19	21	20	18	23
Software	15	21	22	22	26
Elektronics	19	22	24	27	26
Film, music	21	25	24	25	30
Clothes, sports gear	28	35	37	39	43
Literature (books, magazines)	31	36	37	40	44
Tickets for events	22	33	36	37	45
Travel, holidays, accommodation	35	44	47	47	58

<sup>1)</sup> Internet users who bought products online in the three months before the survey.

<sup>2)</sup> E.g. furniture, washing machines, toys.

Source: Statistics Netherlands, ICT use by households and individuals, 2005-2009.

## Annex II

### Measurement of e-commerce in the Netherlands

1. In this appendix we briefly describe the Statistics Netherlands' experience in developing and collecting data on e-commerce. The discussion also highlights some of the data collection gaps as well as other outstanding problems. To date, Statistics Netherlands' activities on e-commerce data collection are divided into three categories: business statistics, ICT and automation surveys and household surveys.

#### A. Survey: Automation and ICT

2. The automation survey (currently called the survey on ICT in Enterprises) started in 1982. The rapid developments in ICT in the last two decades made it necessary to regularly update the contents of the survey. During the first years, the questions focused on the costs of automation, computer personnel, and the ownership of computers. The emphasis has shifted to the use of external networks like the internet. Total e-commerce sales has been included in each yearly survey since 1999.

3. The first EU harmonized survey started in 2001, initially as a pilot. Questions included in this "Pilot-survey e-Commerce", relate to "electronic commerce" in the year 2000, and have been incorporated in the "Automation Survey 2000". Since 2002, there is a yearly "Community Survey on ICT Usage and e-Commerce in Enterprises" held, on the basis of a Eurostat questionnaire list. Since 2001 till 2008, data across some EU (later all EU) countries can be compared in a similar fashion.

4. By year, the following e-commerce variables are included:

##### 1. 2000:

- % of turnover generated via electronic networks
- the Netherlands, EU, non-EU
- B-to-B commerce versus other types
- % of purchases generated from electronic networks

##### 2. 2001, 2002:

- % of turnover generated via electronic networks
- the Netherlands, EU, non-EU
- B-to-B commerce versus other types
- internet, other electronic networks
- % of purchases generated from electronic networks
- internet, other electronic networks

##### 3. 2003, 2004, 2005:

- % of turnover generated via internet
- % of turnover generated via other electronic networks

- the Netherlands, EU, non-EU
- B-to-B, B-to-C, B-to-government commerce
- % of purchases generated from internet
- % of purchases generated from other electronic networks

**4. 2006, 2007:**

- % of turnover generated via internet
- % of turnover generated via other electronic networks
- % of purchases generated from internet
- % of purchases generated from other electronic networks
- 

**5. 2008:**

- % of turnover generated via a public website
- % of turnover generated via automated data exchange or other private systems
- Total e-turnover: the Netherlands, EU, non-EU
- % of purchases generated via electronic networks
- Total e-purchases: the Netherlands, EU, non-EU

5. In addition to questions related to the quantity of e-commerce, there are also questions on the usage of diverse ICT-components such as website, CRM (customer relation management) and SCM (supply chain management).

## **B. Statistics Netherlands definition of e-commerce**

6. In the Statistics Netherlands' survey on ICT in Enterprises 2008, the following question related to e-commerce sales is asked:

"Did your enterprise receive orders for products or services via internet or computer networks (excluding manually typed e-mails), during 2008?"

7. This questions is entirely taken from the Eurostat definition (Eurostat, "Eurostat model for a Community Survey on ICT Usage and e-Commerce in Enterprises 2009", version 1.1.). It is noted that the Eurostat questionnaire adopts the OECD definition on e-commerce:

"e-Commerce means:

- - the placement of orders, where an order is a commitment to purchase goods or services,
- - via computer networks, not only the Internet but also other connections between computers of different enterprises,
- - where payment and delivery does not have necessarily to be done via computer networks.
- - e-Commerce may be done via websites or via automated data exchange between enterprises or organisations, but it excludes normal e-mail messages that are manually typed.

- - Sales via website ,i.e. orders made at an online store or via web forms on the Internet or extranet."

8. In CBS publications, we refer to an Eurostat definition on e-commerce:

"Placing or receiving orders for goods or services through electronic networks, regardless (!) of delivery and payment methods. Excluding orders by telephone, fax, or conventional e-mail."

9. Important to note is that respondents of the ICT-survey are not aware of this definition above which makes it prone to their interpretation of a e-commerce definition that is being used in questions.

10. The Statistics Netherlands (and Eurostat) definition of e-commerce includes e-commerce turnover that is realized via the internet and other networks such as EDI/ADE. During the first years of the Eurostat-survey, this turnover was distributed among the technology type of the network: turnover via internet, turnover via EDI through internet networks, and turnover via EDI through other (non-internet) networks. Recently, a more relevant categorical split is used: "public" e-commerce (it is always via internet and via a website, it may be occasionally, and includes either B-to-B and/or B-to-C) and "private" e-commerce sales media such as EDI/ADE (it refers to B-to-B via the internet and other private networks).

## C. Business Statistics

11. The business statistics (sometimes referred to as production statistics) includes questions related to e-commerce turnover generated via the internet. However, this is only limited to retail, and travel and wholesale. The following problems related to collection and registration of data are faced:

- It is political difficult to expand the questionnaire to e-commerce related questions.
- The sample does not capture e-commerce sales through the internet in case such activities are considered as secondary (side) activities.
- The response on the question on e-commerce is often inaccurate and there is less control for imputation.
- Structural mistakes: for instance, retailers that moved to e-commerce sales as a primary activity are still being classified as retail sales.
- The interpretation of the e-commerce definition is often misunderstood.
- Imports and exports of e-commerce goods and services are not observed.

12. What are the possible solutions?

13. The subject of the capacity to analyze the issues and on the topic, to develop appropriate statistical process. For example,. In fact, you need information about a combination of domestic/overseas sales and wishing/other sales channels. That was not present at the moment.

- Extra capacity in order to analyze and refine e-commerce activities within an appropriate statistical process.
- The questionnaires and the samples should be adapted and the observation must be consistent
- Need of information about a combination of domestic/overseas sales and other sales channels.

14. An intermediate conclusion is that, currently, there are no opportunities for analyzing e-commerce from the production side completely. There is a lack of capacity, especially with the forthcoming activities (changeover to SBI2008 and other organizational issues). In a past effort (three or four years ago), a task group already tried to learn about e-commerce in the wholesale from the answers to the questions put to them. However, these results were unreliable. The major constraint is that respondents were unaware of subdividing the turnover into different types of transaction modes (postal, electronic networks, shops) which should have resulted into non-response items instead of zero values.

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