EXPORT AND IMPORT STATISTICS ON E-COMMERCE IN COMPUTER SERVICES: CLASSIFICATION AND EVALUATION CHALLENGES

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Abstract. The specific domain of e-commerce within computer services has been insufficiently explored as a distinct area of scholarly inquiry. It is typically subsumed under the broader umbrella of ICT services, a classification that complicates accurate statistical market assessments. Present static accounting methodologies provide only a roundabout means for estimating the scope of international trade activities within the computer service sector. This study engages in a comprehensive analysis of the nuances involved in accounting for the export and import of computer services. It examines the global practices of data gathering for statistical purposes, confronts classification dilemmas, and addresses the complexities of identifying the service delivery location and mode. The culmination of this analysis is a set of proposed enhancements to statistical accounting methods. For the sake of international comparisons, it is advisable to equate the cross-border e-commerce of computer services with the exportation of services through the first mode of cross-border supply, which constitutes approximately 75% of all exported computer services. The adoption of more granular tracking methodologies for cross-border transactions necessitates the creation of a standardized ontology at the international level. The urgency of establishing a definitive conceptual framework and performing a thorough market analysis for e-commerce is underscored by the need to fine-tune policy support measures, evaluate the export potential of emerging markets, propose exemptions for e-commerce from traditional trade regulations, implement fair taxation policies, avert discrimination in determining the tax base, promote statistical coherence, and sustain a consistent stance during international negotiations and disputes resolution.

Keywords: e-commerce, computer services, international trade, IT export, statistical accounting, external economic relations, international comparisons.

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Introduction

E-commerce has long been predominantly linked with the trade in goods, both domestic and across borders. However, as new technologies emerge and become increasingly integral to economic processes, the e-commerce of services—especially computer services—is gaining traction. This notable shift has not been sufficiently explored in academic research. Computer services, as a subject of e-commerce, have not yet been recognized as a standalone field of scientific research, often being lumped together with other ICT services without specific consideration of their delivery channels. The broader research community has mostly concentrated on the trading of goods over the internet, a phenomenon more extensively studied than the electronic commerce of services. Services, by their nature, pose more significant challenges in classification and identification within cross-border trade contexts.

As the digital era progresses, the prominence of computer and other digital services is set to rise, increasingly supplanting traditional forms of commerce. Computer services, inherently cross-border in nature, are developing their export potential in Russia and around the world, propelled by rapid advancements in ICT. The diminishing costs of onboarding new users, alongside the reduced expenses of development and digitalization of various business functions, enable providers of computer services to effectively segment their processes and relocate them globally. Growing participation of global economies in the cross-border trade of computer services is a persistent trend in the world economy. Trade in computer services started with the procurement of simple software development, digital content creation, call center and customer support outsourcing, and has since broadened to encompass more complex processes like system modeling and R&D, as well as widespread access to platform solutions, database services, and other innovative "digital" services without physical market equivalents.

Statistical challenges dealing with the export and import of computer services emerge at various stages, including: (1) collecting statistical data on the volumes of cross-border e-commerce for the computer services market; (2) developing ontologies and classifiers specific to computer services; (3) determining the delivery method; (4) identifying the location of the seller and the buyer.

Primary Data Collection Methodologies

Monitoring of cross-border service flows in the IT market is conducted by government agencies, analytical and scientific organizations, IT companies, and business associations, using different methodologies and data sources, which leads to significant discrepancies. In most countries, a combined approach is used, incorporating elements of the following methodologies:

1. Payment data methodologies. This approach involves collecting data on payments for IT services made between residents and non-residents. Sources include reports from banks, tax authorities, and government statistical agencies. Countries that use the International Transactions Reporting System (ITRS) for compiling balance of payments can also obtain transaction-by-transaction statistics that reflect the seller's and buyer's economic territory.

2. Company activity survey methodologies. This approach involves collecting data on the activities of IT services providers through surveys and statistical studies.

3. Tax reporting methodologies. A number of countries have introduced special regulations that allow for VAT collection from foreign service providers delivering digital services to resident users. This data collection is complicated by the requirement for companies to register for tax only after exceeding a certain sales threshold in the country. Consequently, smaller transactions, which cumulatively represent a growing segment of the total turnover due to the proliferation of e-commerce and the broadening scope of computer service exports, elude statistical representation.

4. Expert assessment methodologies. This approach implies that the share of computer service exports delivered cross-border (method 1) is assessed, which is applied to the overall IT services export. It is also used to estimate volumes of IT service exports that are not captured in official source reports.

The Handbook on Measuring Digital Trade, jointly developed by the OECD, WTO, and IMF (2023), suggests combining various sources of information to obtain the most accurate representation of the volume of cross-border service flows transmitted digitally.

In Russia, the Central Bank accounts for IT service exports based on payment data related to the export of software, consulting services in information technology, data processing services, and other computer services. The Federal State Statistics Service accounts for IT service exports based on data on the IT-exporters` activities. There are also several non-governmental organizations that assess the volume of IT service exports based on surveys, including the Non-profit Partnership RUSSOFT and the Association of Computer and Information Technology Enterprises.

International Service Classifiers

The classifications used today and the statistical information collected in their basis do not allow for a clear delineation and measurement of the volume of cross-border trade in computer services. When conducting temporal and cross-country comparisons, there is a need to rely on existing classifications to obtain statistically significant results. To most accurately describe the concept of e-commerce in computer services, let's consider the related concepts at the intersection of which it is located: computer and digital services.

In a broad sense, computer services are part of the ICT (Information and Communication Technology) sector, which includes [1]:

- Hardware, technical devices (servers, personal computers, data transmission equipment, etc.)
- Software, including system and application software
- Computer, information, and telecommunication services.

International organizations (WTO, World Bank, UNCTAD) often combine computer, telecommunication, and information services into a single concept of "ICT services" for the purposes of statistical accounting.

Table 1. Approaches to the Classification of Certain Computer Services Based on International Frameworks

	BPM6	MSITS 2010	CPC v.2.1 (2015)	ISIC Rev. 4	GNS/W/120
Sale (development, production, and supply) of **custom software** and related usage licenses	Computer services	Software (9.2.1.)	On-line content (843)	Software publishing (582)	Software implementation services
Acquisition of ownership rights for **packaged software** delivered electronically	Payments for the use of intellectual property	Software (9.2.1.)	On-line content (843)	Software publishing (582)	Software implementation services
Mass-produced software, downloaded or delivered by other electronic means, without the right to reproduce and distribute	Computer services	Software (9.2.1.)	On-line content (843)	Software publishing (582)	Software implementation services
Services for technical consulting and implementation of hardware and software solutions, including management of activities related to the provision of computer services outsourced to subcontractors	Computer services	Other computer services (9.2.2)	Management consulting and management services; information technology services (831)	Computer programming, consultancy and related activities (6201, 6202, 6209)	Consultancy services related to the installation of computer hardware Software implementation services
Data recovery services, consulting, and assistance in issues related to the use of computer resources	Computer services	Other computer services (9.2.2)	Management consulting and management services; information technology services (831)	Computer programming, consultancy and related activities (6201, 6202, 6209)	Database services

	BPM6	MSITS 2010	CPC v.2.1 (2015)	ISIC Rev. 4	GNS/W/120
Technical maintenance and other support of systems, specifically including staff training as part of technical consulting	Computer services	Other computer services (9.2.2)	Management consulting and management services; information technology services (831)	Computer programming, consultancy and related activities (6201, 6202, 6209)	Other
Analysis, development, and programming of ready-to-use systems (including web page design and development)	Computer services	Other computer services (9.2.2)	Management consulting and management services; information technology services (831)	Computer programming, consultancy and related activities (6201, 6202, 6209)	Other
Data processing services, including data entry, tabulation, and processing data in a shared computer time environment;	Computer services	Other computer services (9.2.2)	Management consulting and management services; information technology services (831)	Computer programming, consultancy and related activities (6201, 6202, 6209)	Data processing services Database services
Web page development, design, and hosting services;	Computer services	Other computer services (9.2.2)	Management consulting and management services; information technology services (831)	Computer programming, consultancy and related activities (6201, 6202, 6209)	Other
Provision of application packages, hosting of clients' application software.	Computer services	Other computer services (9.2.2)	Management consulting and management services; information technology services (831)	Computer programming, consultancy and related activities (6201, 6202, 6209)	Other

Source: compiled by the author

In 2002 the United Nations Statistical Commission released the first **Manual on Statistics of International Trade in Services** (latest edition MSITS 2010), which includes the Extended Balance of Payments Services Classification (EBOPS 2010). The IMF's **Balance of Payments and International Investment Position Manual** (BPM6) is used by central banks for recording export-import transactions. Both manuals contain the following definition of computer services: "Computer services comprise services related to hardware and software and data processing services." According to the classification of both manuals, "computer services" are represented in the category "telecommunications, computer, and information services" and include the subcategory "software," specifically referring to software development services. Revenue from

the distribution/reproduction of software falls into payments for the use of intellectual property. The most comprehensive list of computer services is presented in EBOPS 2010 (see Table 1).

The United Nations Central Product Classifier 2015 (CPC v.2.1) does not separate computer services into a distinct class. The subclass "Software" of BPM6 corresponds most closely to subclass 843 " On-line content " (class 84 " Telecommunications, broadcasting and information supply services"), which includes downloadable software for devices, online games, and providing online access to mass-produced software. The subclass "Other computer services" corresponds to subclass 831 " Management consulting and management services; information technology services " (class 83 " Professional, technical and business services, except research, development, legal and accounting services"), which includes technical consulting and support services, development of information systems, production of original software (systemic and application), data hosting services, web page hosting, computer systems management, etc.

It is also of interest to compare the above stipulated classificators with the **United Nations International Standard Industrial Classification of All Economic Activities** (ISIC Rev. 4) from 2008. Generally, services related to software can be included in the subclass "Software publishing" of the class "Publishing activities." While most of the "Other computer services" subclass in BPM6 corresponds to class 62 "Computer programming, consultancy and related activities" which is divided into subclasses "Technical consultancy and computer management", "Computer programming" as well as the class "Information services" in terms of data processing and hosting.

The Classified list of services by sectors (GNS/W/120), prepared by GATT in 1991, which is used to frame the commitments of the WTO members, identifies "computer and related services" as a subclass of ICT services. In turn, computer services are broken down into: A.a. Consultancy services related to the installation of hardware. A.b. Software implementation services. A.c. Data processing services. A.d. Database services. A.e. Other services. Despite the fact that the supporting documentation contains the corresponding SPC v.1 classification codes, a comprehensive mapping is not possible due to the changes the computer services market has undergone in the 30 years since the release of GNS/W/120. In the current research, the concept of computer services will be used as disclosed in the BPM6 classification, since it is this approach that is used by leading international (UNCTAD, ComTrade, WTO) and national organizations (Bank of Russia, FCS of Russia, Rosstat) in forming statistics. Outside the scope of this study remain computer services that are provided through channels other than electronic (hardware repair, provision of software licenses on physical media). A comparative analysis of existing classifications revealed a number of contradictions and discrepancies:

Types of licenses. Periodic licensing fee for software is related to computer services. Payments for licenses for reproduction and/or distribution of software are included in the fees for the use of intellectual property. When acquiring full exclusive rights to soft-

ware, the transaction can be classified both as computer services based on EBSS-2010 ("Purchase and sale of originals and property rights to system and application software packages"), and as trade in intellectual property. In practice, this contradiction complicates the quantitative and qualitative assessment of export-import operations. Thus, companies transfer revenue from the sale of their software abroad to Russia not only under the code "provision of computer services", but also as "payments for the use of intellectual property", "transfers to individuals" or "investments."

Business services in digital form. The classification of business services provided in digital form, which have or do not have analogs in the offline economy, requires special attention. From the perspective of UNCTAD [5], non-exclusive end-user licenses, which among other things can include paid applications used online or downloaded to devices, are related to computer services (EBOPS 2010 section 9.2.1. Software as "mass-produced software, downloaded or delivered by other electronic means"). Here, the emphasis is specifically on electronic commerce of computer services as a method of delivery.

At the same time, EBOPS 2010 contains a clarification that "computer services and telecommunications services are defined **in terms of the nature of the service, not the method of delivery**" [8]. A similar statement is contained in RPB-6 "Computer and telecommunications services are determined by the nature of the service, not the way it is provided" in connection with the fact that business services are reflected in the corresponding sections, even if they were provided using information technologies and have a digital nature. For example, the development of an advertising targeting algorithm is classified as computer services, but the provision of internet marketing services itself will not fall into this category. The remuneration of marketplaces falls into the category of other commercial services, activity-tracking applications – to healthcare services, etc.

The abundance of overlapping concepts complicating statistical accounting. Despite the abundance of definitions presented in scientific works and materials of international organizations (computer, information, telecommunications services, services in electronic form, remote services; services provided through ICT, digital services, electronic services, etc.), the classifications used at the international level for statistical purposes are not keeping up with the dynamic development of the conceptual apparatus. At the same time, uniformity in this matter is extremely important for measuring and tracking the volumes and directions of cross-border trade flows of computer services, their analysis, and forecasting, which is a key element in developing an effective trade policy and applying adequate export stimulation measures.

The emergence of new forms of trade in computer services. A classic example is the sale of software licenses in conjunction with software-hardware systems or freemium models based on advertising in applications or collecting large data about users.

Thus, different classifications are used by the Central Bank and the NP "Russoft". Russoft investigates the volume of overseas sales (total revenue) of Russian software companies in foreign markets, as well as takes into account sales of software, equip-

ment (terminals, simulators, etc.), advertising placements, and other results of commercial activity. The Central Bank accounts for revenues from the sale of equipment and advertising, and in some cases, the cost of installed software is included in the cost of the equipment.

Definition of the Mode of Supply

According to the General Agreement on Trade in Services (GATS), services can be delivered in one of four ways, depending on the country of location of the seller and the consumer: cross-border supply of services (1), consumption abroad (2) commercial presence (3), and movement of natural persons (4). Defining the mode of delivery for computer services is quite challenging since the division is sometimes not obvious. Already in 2001, the Guidelines for the Scheduling of Specific Commitments under the General Agreement on Trade in Services (GATS) posed an open question about the blurred boundary between mode 1 and mode 2 for electronic services: for them, the physical presence of the consumer is not required at all, which makes the difference between these modes of delivery less significant. For example, a web user consumes a computer service by accessing a server located abroad. Does this mean that the server carries out cross-border delivery of the service (mode 1) or does the user virtually travel abroad to consume the service (mode 2) [12]? It is interesting to trace the analogy with retail electronic trade in goods, which has traditionally been equated to private imports (importation of goods purchased abroad for personal needs in accompanied or unaccompanied baggage). That is, applying a similar approach, electronic trade in services can be attributed to mode 2.

EBOPS-2010 proposes dominant modes for different types of services. Thus, computer services are predominantly delivered by mode 1 (cross-border transmission) and mode 4 (movement of natural persons). For the purposes of this study, it is reasonable to assume that **electronic trade in computer services corresponds to computer services delivered cross-border (mode 1)**. A similar approach is highlighted as recommended for the statistical assessment of services delivered through ICT, in accordance with the UNCTAD Technical Note on ICT Development [5] and the Handbook on Measuring Digital Trade [9].

To date, there are no reliable and stable sources of international trade statistics that allow tracking the movement of services with a breakdown by modes of supply. Some countries provide differentiation by modes of supply based on business surveys. For example, New Zealand reflected in its statistical yearbook for 2012 that 85.8% of exported commercial services were transmitted by mode 1, with mode 4 accounting for 28% [11].

The Bank of Russia has been publishing the statistics of external trade in services by modes of supply since 2021. The corresponding methodology involves attributing computer services to mode 1, except for cases when: (1) the service consumer is located abroad in a third country different from the country of residence of the seller and

buyer (mode 2); (2) services provided during a personal visit by the seller's specialist (mode 4). "Other business services" are also attributed to mode 1. The Bank of Russia forms a statistical base based on transactional banking reporting on foreign trade settlements. The main factor on which the distinction of transactions by modes of supply is made is the location of the banks where the accounts of the buyer and the seller are opened. If there is a cross-border transfer of funds (and both the buyer and seller use accounts in banks in their countries for settlement), the operation relates to mode 1. Mode 2 includes cases where the service consumer's bank is located on the economic territory of the seller. Conversely, if the seller receives funds to an account opened in a bank on the territory of the non-resident buyer, then the operation is related to mode 4. Analysis of banking reporting gives the most accurate results possible, as it allows for categorization of flows by mode of supply for each separate operation, rather than aggregating into categories that are more characteristic of one mode or another. At the same time, given the variety of settlement models, this distinction may seem artificial, since it is based not on the economic sense and actual conditions of service supply, but exclusively on the movement of funds for it. This statistics will have minimal value in cases where research tasks require tracking "pure online", when not only the delivery but also the ordering of services, communication between the seller and the buyer occurs in the digital space (digitally ordered and digitally delivered trade). The countries from which the settlements were made may actually not correspond to the economic territories where the service was provided and consumed. In addition, there are significant risks of errors in transaction classification since banks rely on information provided by the transaction participants.

Thus, according to the Bank of Russia, in 2022 the export of computer services from Russia amounted to $5.11 billion, of which $5.04 billion (99%) was accounted for by mode 1. Imports amounted to $3.36 billion, of which 92% was accounted for by mode 1.

The most successful attempt to create an international resource for foreign trade statistics by modes of service supply was the WTO's pilot project TISMOS. Unfortunately, the dataset for 200 countries has only been published from 2005 (from 2010 for EU countries) to 2017. Meanwhile, the TISMOS methodology contains an approximate proportion of the distribution of computer services by modes of supply, which, according to the authors of the methodology, remains stable over time: 75% of cross-border supplies of computer services fall on mode 1; 25% - on mode 4. Similar data are presented in the Handbook on Measuring Digital Trade, 2nd edition (2023) for computer services in general, software, and other computer services.

Furthermore, the granting of rights to original programs is 100% attributed to mode 1. Thus, electronic commerce in computer services is calculated as 75% of the total volume of computer service exports. It should be understood that in practice, computer services can be delivered by any method. For instance, mode 3 would apply to a situation where a provider opens a commercial office in the buyer's country or in

a third country. For example, research centers working for major IT corporations are becoming increasingly popular in the global economy. There are more rare examples of individuals moving abroad to purchase computer services (mode 2).

Certainly, the identified ratio does not reflect country-specific features or conjunctural fluctuations over time. The presence of some error in determining the absolute size and dynamics of up to 10 percentage points is not a serious problem, as the main task of the research is to identify trends (in particular, the dynamics of exports), as well as to measure factors affecting the effectiveness of measures to stimulate the export of computer services.

Determining the Location of the Seller and Buyer

Determining the location of the seller and the buyer is a key element in the statistical accounting of export-import operations of services. E-commerce, as a channel for exporting computer services, creates new challenges in determining the locations of the counterparts.

For corporate customers, the place of realization is the country of state registration. Moreover, the company's address can be traced in the founding documents, the address of the permanently operating executive body, or the permanent representation. For individual buyers, it is possible to determine the place of service consumption by the country of residence, the location of the bank or electronic money operator, the registration of the electronic address, or the country code used for payment.

The domain name of a website, associating it with a certain economic territory, does not allow us to conclude that its owner is also located and conducts activities in that country. Similar discrepancies between the actual cross-border flows of services and those identified by regulators arise when applying other accounting methods, for instance, the seller's bank's country of payment processing and the country of actual service delivery may not coincide.

The role of payment aggregators in the export of computer services is increasing. They provide billing services, receive payments from clients in different countries in any currency, manage personal accounts and tariffs, In this case, the main service is provided directly from seller to buyer, and the funds for it are first credited to the account of the aggregator (settlement or special account) and then transferred to the seller's account after less aggregator`s commission fees charged . This scheme presents certain difficulties for statistical accounting because, firstly, the countries of registration of the seller's company, the buyer, the withdrawal of funds, and the registration of the aggregator itself may not coincide; secondly, the aggregator's fee needs to be analytically separated from the total payment amount for correct classification. Moreover, the national body conducting statistical or tax accounting of such an operation will see a discrepancy between the amount of sale (received by the seller) and the amount of purchase (sent by the buyer) if the intermediary's commission was not allocated as a separate payment.

Ways to Enhance Theoretical Frameworks

Considering the current state of the global market for computer services, the authors propose the following directions for enhancing theoretical approaches to the categorization and statistical assessment of electronic commerce in computer services:

1. Account for the export volumes of various computer services with a higher level of detail [2]. This information will enable quicker market response and facilitate more effective and targeted export stimulation policies. Expand existing classifiers with new types of computer services provided electronically.

2. Establish an international database for service trade, segmented by delivery methods, based on unified approaches.

3. Refine existing service classifiers to more accurately distinguish between computer services, intellectual property usage, and business services, as well as to incorporate the nuances of "freemium" monetization models and new digital production types (such as 3D printing).

4. Develop reporting standards for payment aggregators that would mandate them to provide more detailed transaction data for accounting and analytical purposes.

5. Review and optimize the established threshold values for minor transactions to prevent distortion of the overall picture of service trade.

Findings

1. None of the current statistical accounting methods for the foreign trade turnover of computer services delivered through e-commerce channels adequately reflects the actual flows with the required level of accuracy. Identified limitations include data extrapolation from a select group of companies to the entire market (in the case of surveys), the use of an average coefficient that fails to consider country-specific traits (in supply methods), the exclusion of small transactions below a threshold value (according to tax reports), and the challenge of accurately pinpointing the export and import countries for computer services (based on banking data).

2. An examination of the accepted service classifications has revealed difficulties in distinctly categorizing: computer services versus payments for the use of intellectual property; computer services against business services provided electronically, as well as capturing the entire spectrum of cross-border computer service trade flows, given the variety of payment models. This includes arrangements involving payment aggregators and the "freemium" models for monetization.

3. The most precise methods for statistical accounting purposes involve transactional tracking of cross-border flows. However, in the absence of uniform standards for statistical accounting of computer service exports and imports, such derived figures are only viable for temporal comparisons within a specific country. For inter-

national comparative purposes, it is practical to assume that cross-border electronic trade in computer services is synonymous with the export of computer services via the method of cross-border delivery (method 1), which comprises 75% of the total computer service exports.

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