UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

Technical and statistical report

TiSSTAT

An information system for compiling trade in services statistics through enterprise surveys

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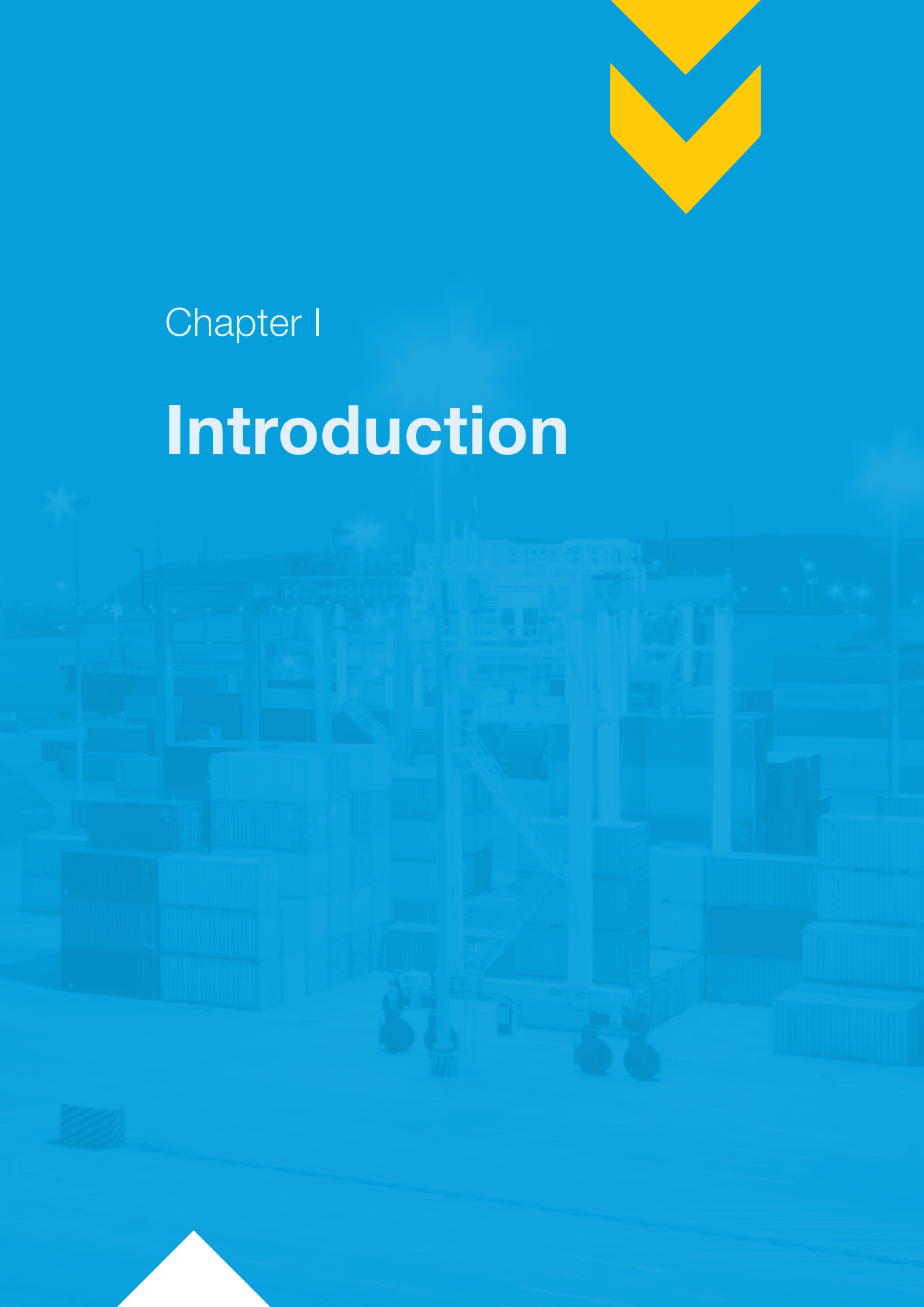
Chapter I

Introduction



TiSSTAT is an information system with an integrated questionnaire, a multi-user application and associated methodology to conduct enterprise or establishment surveys for trade in services statistics. This paper presents the information system, its motivation and its implementation.

This technical paper offers a complete and practical approach to the compilation of trade in services statistics using an information system developed by United Nations Conference on Trade and Development (UNCTAD), titled TiSSTAT which stands for Trade in Services Statistics.

UNCTAD supports countries in developing their capacity to measure and analyse trade in services and promotes evidence-based approaches to trade policy and the analysis of the role of trade in development. TiSSTAT is a tool UNCTAD developed to assist member states in setting up or improving procedures for compiling trade in services statistics. The tool and this related technical paper are intended to help countries address data gaps that are currently preventing evidence-based trade policies in many countries, and thus, hampering countries' full integration into the growing global services trade.

TiSSTAT is intended to be used by national authorities and can be installed on the servers of institutions compiling services trade statistics as a complete package supporting work from data collection and compilation to dissemination. The information system contains the following three central and interlocking elements:

- A questionnaire developed by UNCTAD for surveys on international trade in services.
- A multi-user application for collecting, cleaning and analysing responses using the questionnaire.
- A set of methodology options to go with the questionnaire and the collection method embedded in the information system.

The most tangible part of the information system is the multi-user application and as a shorthand this is often what is referred to with the term TiSSTAT. The questionnaire and associated methodology are fully embedded in the application.

TiSSTAT offers an approach for countries to enhance their capacity to compile internationally comparable trade in services statistics, as one of the few global software solutions available. TiSSTAT and methods applied therein are fully aligned with the Manual on Statistics of International Trade in Services 2010 (MSITS 2010; United Nations et al., 2012), the associated Compilers Guide (MSITS-CG; United Nations et al., 2016) and in extension to the Sixth Edition of the International Monetary Fund's (IMF) Balance of Payments and International Investment Position Manual (BPM6; IMF, 2009).

TiSSTAT offers one of the many possible implementations of the guidelines presented in MSITS 2010 and MSITS-CG and a set of practical tools to facilitate that implementation. MSITS 2010 and MSITS-CG are comprehensive in presenting the alternatives for data sources used to compile trade in services statistics and the considerations associated with those alternatives. TiSSTAT entails a concrete choice to use enterprise or establishment surveys as the primary source of data. Building on that choice, TiSSTAT offers useful practical guidance for compiling institutions interested in establishing a new or improving on an existing survey framework for compiling trade in services statistics. The practical guidance in this technical paper can be implemented in full or in parts.

TiSSTAT is designed to be installed at and, thereby, fully owned by a local statistical authority conducting an enterprise or

A complete and practical solution for compiling trade in services statistics using enterprise or establishment surveys

an establishment survey. This can be a national statistical office, central bank or other institution. In this paper we will refer to the local institution where TiSSTAT is installed as the *survey institution*. We will refer to individuals accessing the TiSSTAT application as *users*.

A salient part of what TiSSTAT offers is electronic questionnaires for trade in services statistics. MSITS-CG notes that the *"use of electronic questionnaires improves accuracy and timeliness and, at the same time, reduces survey cost, reporting burden and processing burden"* (United Nations et al., 2016, para 21.8). Developing an electronic questionnaire and related data handling procedures may prove costly and challenging. TiSSTAT gives access to this advantageous use of technology for survey institutions that do not wish to or have the resources to develop it for themselves. In this sense, TiSSTAT represents the results of an international cooperation to pool experience and resources to develop a standardized and generalized solution. TiSSTAT will evolve on the basis of feedback provided, with the increase of user base and with evolvements in practices to compile trade in services statistics. TiSSTAT is a system that is ready but can still evolve, as it can be adjusted to new needs and data environments.

The TiSSTAT application is accompanied with a detailed and comprehensive user's manual presenting the functionality of TiSSTAT encyclopedically with specifications for each menu and operation (at the time of writing available in French). This paper, on the other hand, gives a conceptual overview of the information system which allows a survey institution to judge the appropriateness of the system for their purposes. While the user's manual is updated frequently together with updates to the software, the guiding principles presented in this paper remain more stable.

This paper is written describing version 1.4.3 of TiSSTAT released in November 2024. Iterative improvements to the application mean that screen shots and other details about the information system are unlikely to be a perfect representation of later TiSSTAT versions. However, the principles guiding the development and the functionalities prioritized will still apply.

a. Structure of the technical paper

In chapter II, we highlight the relevance of trade in services, the importance of statistics in the area and the role that enterprise and establishment surveys play in trade in services statistics.

In chapter III, we discuss the context for statistics compilation. TiSSTAT offers a package of practical tools, but those tools will not have full utility if not implemented in an environment where the status of statistical surveys is established, statistical work is coordinated and there is a clear picture of what enterprises should be surveyed.

Chapters IV to VI discuss the three elements of TiSSTAT. A major part of the survey is the design of the questionnaire and merits its own chapter. Chapter IV discusses the development work conducted by UNCTAD, the choices made, and the features of the questionnaires used in TiSSTAT. Chapter V discusses the features of the multi-user application that users often think of when mentioning TiSSTAT. The methods implemented in version 1.4.3 of the application are covered separately in Chapter VI.

Chapter II

Trade in services and trade in services statistics

The service sector is central to a diversified economy, and trade in services plays a similarly important role in a country's trade portfolio. Detailed trade in services statistics is essential for policymaking, trade negotiations, and identifying economic opportunities. However, significant data gaps remain in trade in services statistics, particularly in details on services traded, partners and mode of supply. Enterprise and establishment surveys are especially effective for collecting these details. TiSSTAT is designed to maximize the potential of surveys while addressing their challenges. It reduces the response burden for the enterprise and reduces the costs associated with conducting surveys.

a. Trade in services in the global context

Services are defined in the System of National Accounts 2008 (SNA; United Nations et al., 2009) and in the Balance of Payments Manual, 6th edition(BPM6; IMF, 2009) as follows:

"Services are the result of a production activity that changes the conditions of the consuming units or facilitates the exchange of products or financial assets. These types of service may be described as change-effecting services and margin services, respectively. Change-effecting services are outputs produced to order and typically consist of changes in the conditions of the consuming units realized by the activities of producers at the demand of the consumers. They can also be referred to as 'transformation services'. Margin services result when one institutional unit facilitates the change of ownership of goods, knowledge-capturing products, some services or financial assets between two other institutional units. Margin services are provided by wholesalers and retailers and by many types of financial institutions. Services are not separate entities over which ownership rights can be established. They cannot be traded separately from their production. By the time their production is completed, they must have been provided to the consumers." (United Nations et al., 2009, para 6.17)

The Balance of Payments Manual, 6th edition (BPM6; IMF, 2009) addresses the practicalities of international trade and builds on the definition in SNA by acknowledging that certain knowledge-capturing products, such as computer software and intellectual property products, may be traded separately from their production, similar to goods. BPM6 also explicitly links services to goods in specific contexts (such as travel, construction and government goods and services n.i.e; see BPM6 para 10.8). Services, thus, encompass a heterogeneous range of intangible products and activities, such as services related to manufacturing, construction, and transport as well as travel, telecommunications, business and cultural services. (See a full list of the main service categories in section II.b.2.)

1. Importance of services

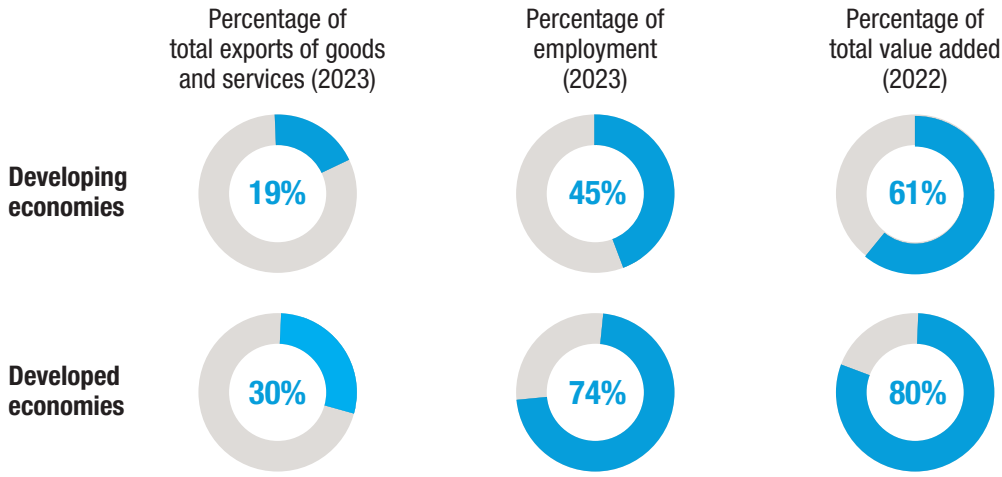
The importance of the services sector in economic and social transformation is increasing. Services are a central part of a diversified economy. UNCTAD recognizes that many developing economies are commodity dependent and to the extent manufacturing and services are a part of the trade portfolio they tend to be tied to lower value added activities. For these reasons, one of the roles of UNCTAD is to *"support and promote activities and initiatives in developing countries through the improvement in*

trade in services" (Bridgetown Covenant, UNCTAD, 2021; para 41, 51).

The service sector account for a substantial part of employment and is critical for economic transformation

Services—or the tertiary sector in the economy—have been a motor of economic growth and development, with a rising contribution to economic value added and employment worldwide. Services are necessary linkages which underpin all economic activity and are increasingly being internationally traded. For most economies, regardless of their development status, services became long ago the sector bringing most economic value added to the society. In developing economies, in 2022, the services sector accounted for 61 per cent of total value added. In developed economies, it represented a remarkable 80 per cent. Services activities not only serve other sectors—such as transport and financial services serving agriculture and industry—but are directly embedded in many products: a car for example. The service sector is often the biggest employer in society. In developing economies, it accounted for some 45 per cent of total employment in 2023. In developed economies, 74 per cent of the employees worked in the services sector. International trade would not be possible without the support of services that are internationally sold. In 2023, services represented about 19 per cent of total exports of developing economies. For developed economies, they accounted for 30 per cent of total exports of both goods and services (see figure II.1).

Figure II.1.
The service sector makes up a substantial part of economies
Contribution of services sector to key economic indicators (Percentage)



Sources: UNCTAD calculations based on UNCTAD (2024a) for exports, International Labour Organization (2024) for employment and UNSD (2024a) for value added.

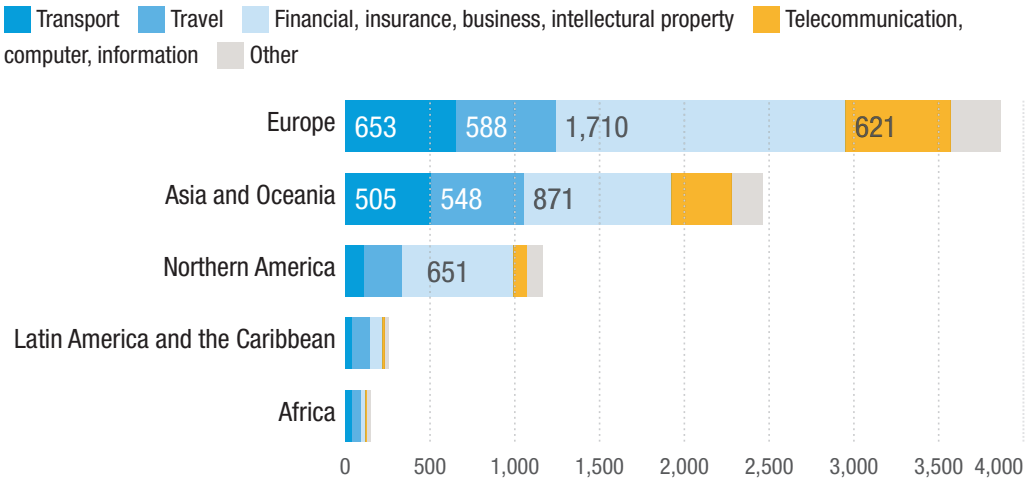
Note: Employment figures for 2023 cover 81 economies.

Services like transport, telecommunications, information technologies, financial and various business services underpin economic development and link entrepreneurs, businesses, institutions and households. It is important for analysts and policy makers to have reliable statistical information about developments in the services sector, including its international trade trends.

World services exports reached $7.9 trillion in 2023. At the regional level, Europe is the biggest services exporter, accounting for 49 per cent of global exports in 2023. Asia and Oceania provided 29 per cent and Northern America 16 per cent of total services exports. Africa and Latin America and the Caribbean combined captured less than 6 per cent of the world market. In Latin America and the Caribbean and in Africa,

the most exported category was travel: 42 and 35 per cent, respectively. Transport and travel account for a larger share of services exports in these two regions than in other parts of the world. Services exports from Asia, Europe, and Northern America are dominated by knowledge-intensive services, such as financial, insurance, telecommunication, computer, business and IP-related services (see figure II.2).

Figure II.2.
Exports of services are relatively low in the global south
Services exports by region and service category 2023 (in billions of United States dollars)



Source: UNCTAD and World Trade Organization. Published on the UNCTADstat Data Centre (UNCTAD, 2024a).

The share for developing economies in global services exports rose from 21 per cent in 2005 to 30 per cent in 2023. The gained market share was predominantly an achievement of Asian developing economies. In 2023, the top five services exporters or importers among developing countries were all from Asia. The five leading exporters accounted for 56 per cent of total developing economies' exports. Similarly, in imports, they accounted for 53 per cent. International trade in services is important for the integration into global trade and financial flows. See the UNCTAD Data insights for more trends in trade in services data (UNCTAD, 2024b).

Although many developing economies have not managed to increase their share in international trade of services, the values of services exports recorded have been rising in general. Besides, some economies may not be capturing parts of the international services trade their residents engage in. The recent information and communication technologies (ICT) advancements, such as online ordering, online delivery and online payments, have made international trade more accessible to people. And more difficult to capture statistically.

2. How UNCTAD engages in the development and trade in services

When outlining UNCTAD's workplan and role, the outcome document of the 15th session of the United Nations Conference on Trade and Development (UNCTAD XV, held in Bridgetown, Barbados, in October 2021) highlighted that UNCTAD should *"support and promote activities and initiatives in developing countries through the improvement in trade in services..."* (UNCTAD, 2021, para 127 ff). UNCTAD does this in multiple ways.

Together with the World Trade Organization (WTO), UNCTAD compiles and publishes **statistics on international trade** in services for public use. Data can be accessed via the UNCTADstat Data

Centre (UNCTAD, 2024a) with brief analysis and visualizations in UNCTAD's Data Insights (UNCTAD, 2024b).

UNCTAD's **Multi-Year Expert Meeting on Trade in Services and Development** provides a platform for fostering dialogue among policymakers, statisticians, and trade experts on the role of services in economic development. These meetings aim to address key challenges in services trade, such as data gaps, regulatory barriers, and the integration of digital trade. By bringing together experts from diverse sectors and regions, UNCTAD facilitates the exchange of best practices, innovative approaches to data collection, and insights into the impact of trade policies on sustainable development. The meetings also contribute to shaping international standards, such as the ongoing revisions of the MSITS, ensuring relevance in a rapidly evolving global economy.

UNCTAD's **Services Policy Reviews (SPRs)** assist developing economies in designing evidence-based policies to enhance their trade in services. These reviews provide in-depth analyses of a country's services sectors, identifying opportunities and constraints to their development and integration into global markets. SPRs offer tailored policy recommendations, focusing on regulatory frameworks, institutional capacity, and strategies to harness the developmental potential of services trade. By aligning with national development goals and international standards, SPRs play a vital role in UNCTAD's broader efforts to provide policy assistance, helping countries craft strategies that foster economic diversification, enhance competitiveness, and promote inclusive growth. The reviews can be accessed via UNCTAD's pages on Services, Trade and Development (UNCTAD, 2024c).

Among its technical assistance projects, UNCTAD engages in many statical capacity building activities with developing economies. It offers courses on international trade statistics for both merchandise and services. Since 2021, 3858 persons (44 per cent were women) from over 190 countries have taken the **e-learning course on trade in services statistics**. The online courses are offered free of charge, in English and French.

The e-learning course on international trade in services statistics was developed jointly by UNCTAD, United Nations Statistics Division and WTO. It is hosted on the **UNCTAD Train-for-Trade Platform**. The course offers self-paced distance learning and online wrap-up webinars. The distance learning course contains six modules and spreads over seven weeks giving participants enough time to engage in the course at their convenience. The modules' coverage is comprehensive, encompassing all stages of standard statistical processes. It presents the background statistical frameworks with internationally agreed definitions, classifications and guidelines.

The six modules are organized as follows:

1. Importance of statistics on international trade in services and main concepts
2. Setting up pre-requisites for data collection and compilation
3. Data sources and collection
4. Data compilation: Balance of payments (BoP) statistics on international trade in services
5. Data compilation: Foreign Affiliates Statistics (FATS)
6. Dissemination and analysis

The course primarily targets compilers of trade and balance-of-payments statistics from national statistical offices and central banks. Its main objectives are to enhance data collection skills, develop trade statistics compilation skills, and understand international trade statistical frameworks and concepts. Furthermore, the course can be very useful for trade analysts and others interested in international trade in services. Read more about the courses on the TrainForTrade webpage (UNCTAD, 2024d).

TiSSTAT has been instrumental in strengthening statistical capacities in trade

in services. It was first developed for the West African Economic and Monetary Union (UEMOA) and its member states. UNCTAD and partners have provided methodological guidelines, harmonized questionnaires, and training to national experts, facilitating the successful implementations of the different elements of TiSSTAT in these countries. This initiative has enabled them to produce country-owned, high-quality trade in services statistics, thereby supporting evidence-based policymaking and contributing to economic resilience and development. Read more about the project on UNCTAD's website (UNCTAD, 2024e).

The TiSSTAT application is a tool developed by UNCTAD to assists developing economies to fill data gaps in trade in services and facilitate and increase the robustness of the compilation of trade in services statistics. TiSSTAT is more than an application. It is part of a full information system implemented with UNCTAD's support, including installation on local servers, training in the use of all its functionalities, and advice on how best to put the information system in use in the local context. The present technical paper provides broader insight into what TiSSTAT can offer in this respect.

b. Statistics on trade in services

1. Uses of trade in services statistics and relevance for Sustainable Development Goals

By fostering the collection and dissemination of high-quality trade in services statistics, countries enhance their ability to meet many Sustainable Development Goals (SDGs) which benefit from services trade. These statistics not only guide domestic policies and trade negotiations but also serve as a cornerstone for international reporting and monitoring frameworks, helping developing economies achieve their global commitments.

a. Demands for policy making

Trade in services statistics are indispensable for evidence-based policymaking. As services become increasingly central to global economic activity, robust data enable governments to craft strategies for economic diversification, employment generation and social inclusion. Policymakers rely on these statistics to identify trends, allocate resources efficiently, and assess the effectiveness of interventions aimed at improving service sector competitiveness. The availability of high-quality, timely, and reliable data also directly supports SDG Target 17.18, which calls for enhanced capacity-building for developing countries, particularly least developed countries (LDCs) and small island developing states (SIDS), to significantly increase the availability of disaggregated data. Such capacity is essential for aligning trade in services statistics within national contexts and ensuring inclusive policymaking.

Trade in services data supports evidence-based policymaking, negotiations, and development strategies

b. Trade negotiations

Trade in services statistics play a critical role in supporting countries during trade negotiations. Availability of accurate data helps countries understand their own interests. By analysing the scale and composition of services trade, policymakers and negotiators can identify sectors of comparative advantage and assess their competitiveness globally. These statistics are essential for fulfilling SDG Target 10.a, which emphasizes the implementation of special and differential treatment for developing countries, particularly LDCs, in accordance with WTO agreements.

Furthermore, trade in services statistics are vital for impact assessment of trade negotiations. They provide a foundation for predicting the implications of trade agreements, including potential gains or losses in specific sectors. For example, in supporting SDG Target 17.11, which aims to significantly increase exports from developing countries and double the share of global exports by LDCs, such statistics

are indispensable. They also contribute to tracking progress on Indicator 17.11.1, which measures the share of developing countries and LDCs in global exports.

c. Identify opportunities

Trade in services statistics also uncover economic opportunities. For governments, data enables the identification of growth sectors, aids in targeting policies for skill development, and helps craft incentives to attract investment in high-potential areas. This aligns with SDG Target 8.a, which seeks to increase Aid for Trade support for developing countries, particularly LDCs, through mechanisms like the Enhanced Integrated Framework for Trade-Related Technical Assistance.

For the private sector, businesses can leverage statistics to identify lucrative markets, understand demand trends, and make informed decisions about expanding their service offerings internationally. Such insights contribute to fulfilling SDG Target 9.3, which focuses on increasing access to financial services, affordable credit, and the integration of small-scale enterprises into value chains and markets. Robust trade in services data is critical for integrating these enterprises into global markets and promoting sustainable development.

2. Classification frameworks and requirements for trade in services statistics

National authorities invest a lot of effort in producing high-quality statistics, including trade in services statistics. First, trade in services statistics should be **fit for purpose** for the analyses in the country to serve national needs for insights.

Second, they need to be **internationally comparable**. Harmonization with international frameworks like MSITS 2010 and the Extended Balance of Payments Services Classification (EBOPS, United Nations et al., 2012, Annex I, p. 145-148; see also UNSD, 2024b) ensures consistency across countries, enabling meaningful cross-border analyses and comparisons. This is useful in a global context but also serves national interests.

Third, they must be detailed enough to enable analysis of the nature of service, partner country, and, as far as possible, mode of supply, each of which fits into the broader System of National Accounts (SNA) framework, providing crucial links between external trade and domestic economic activity.

TiSSTAT supports the application of the Fundamental Principles of Official Statistics (United Nations, 2014) in compiling trade in services statistics, by helping to fill this pressing data gap, enhancing equal access to statistics, safeguarding data security and confidentiality, building on international standards and promoting transparency of statistical production. It aims at statistical outputs that meet the quality criteria for official statistics: relevance, accuracy, reliability, timeliness, accessibility, clarity and coherence.

a. Nature of the service

A breakdown by the nature of the service is a requirement in BPM6, which mandates the classification of services using internationally standardized categories. This classification aligns with EBOPS and ensures that trade in services is systematically recorded and reported across a range of service types. These data feed directly into the **exports and imports of services** component of the SNA, allowing policymakers to evaluate the role of specific service sectors in overall economic performance.

Balance of payments (BoP) and EBOPS, which are fully consistent, identify the following twelve service categories at the highest level, here listed with the codes defined by the Statistical Data and Metadata eXchange (SDMX, 2024):

- SA: Manufacturing services on physical inputs owned by others
- SB: Maintenance and repair services not included elsewhere (n.i.e.)

- SC: Transport
- SD: Travel
- SE: Construction
- SF: Insurance and pension services
- SG: Financial services
- SH: Charges for the use of intellectual property n.i.e.
- SI: Telecommunications, computer, and information services
- SJ: Other business services
- SK: Personal, cultural, and recreational services
- SL: Government goods and services n.i.e.

These twelve main categories are further divided into more specific categories in EBOPS (United Nations et al., 2012, Annex I, p. 145-148; see also Annex B of this paper for specific items in the TiSSTAT questionnaire).

b. Partner Country

In both BPM6 and MSITS 2010, the breakdown by partner country is strongly recommended. It provides insights into bilateral and regional trade relationships, enhancing the ability of countries to monitor trade flows and dependency on specific markets. These details complement the SNA by linking external trade patterns with domestic economic outcomes, supporting strategic diversification and regional economic analysis.

c. Mode of Supply

The Mode of Supply classification is not a requirement in BPM6 but is central to the General Agreement on Trade in Services (GATS). The GATS framework defines four modes of supply:

- **Mode 1: Cross-border supply.** The service itself crosses the border while both the provider and consumer remain in their respective countries (e.g., software provided online).
- **Mode 2: Consumption abroad.** The consumer travels to another country to consume the service (e.g., tourism, education).
- **Mode 3: Commercial presence.** The provider establishes a local subsidiary, branch, or office in the consumer's country to deliver the service (e.g., a foreign bank operating a subsidiary).
- **Mode 4: Presence of natural persons.** Individuals cross the border to provide the service in person (e.g., engineers working onsite abroad).

Mode 3 is significant in global trade in services, accounting for a substantial share of international services transactions. Estimates produced by WTO indicate that mode 3 services sales' value surpasses the value of total services exported via the three other modes (WTO, 2024). Statistics on mode 3 (commercial presence) are critically important for understanding the role of foreign affiliates in global trade and their impact on host economies. Mode 3 is covered by **Foreign Affiliates Trade Statistics (FATS)**, which are not part of the BoP framework but are strongly recommended by MSITS 2010 (United Nations et al., 2012).

The FATS framework covers majority-controlled foreign affiliates (e.g., a single non-resident holds more than 50 per cent of the voting power at each stage of the chain of ownership). Majority-controlled foreign affiliates include branches and subsidiaries. Foreign entities that establish commercial presence in a country, and operates there for more than 12 months, are typically treated as **residents** in the host country, and their transactions within the host country are, therefore, not considered international trade under the BPM6 framework. Modes 1, 2, and 4 are covered by Balance of Payments Services Statistics.

Enterprise and establishment surveys targeting enterprises within a country often encompass foreign affiliates, making them a suitable method for measuring **Inward FATS**, which capture the economic activities of foreign affiliates operating in the country. These surveys provide critical

data on indicators such as employment, value added, and trade activity, helping to bridge data gaps in understanding mode 3's role in global trade.

3. Data gaps

Merchandise trade statistics use customs data as the principal source. Since goods are tangible or *visible* as they cross borders, it is easier to account for them and collect relevant statistics than it is in the case of services, also referred to as *invisibles*. Services cover heterogeneous products and require the use of various data sources for relevant data collection. Some service categories can be well compiled only when a combination of sources is used (for example, *travel, transport*, or *audio-visual transactions*). International trade in services is reported within the current account of the Balance of Payments. Traditionally, most services trade data were collected from the *International Transaction Reporting System* (ITRS), mainly by central banks. ITRS is still used today in many economies, be it for a few selected service categories or for most of them. Some service categories, like *travel* and *transport*, cannot be compiled from ITRS, as only partial information can be obtained.

As a source, ITRS has many advantages, but also some significant limitations. ITRS is based on many individual transactions and draws its precision from the high volume of timely data. The list of respondents is stable, and codes can directly be assigned to principal service categories. Using ITRS is less costly than conducting surveys. The downsides of ITRS include difficulty in handling large data volumes, the impossibility to detect intra-company transactions with netting practices, and misassigning partner economy. Most importantly, detailed EBOPS 2010 items cannot be allocated correctly. Mode of supply cannot be captured either.

Significant data gaps exist, particularly in partner country breakdowns and mode of supply

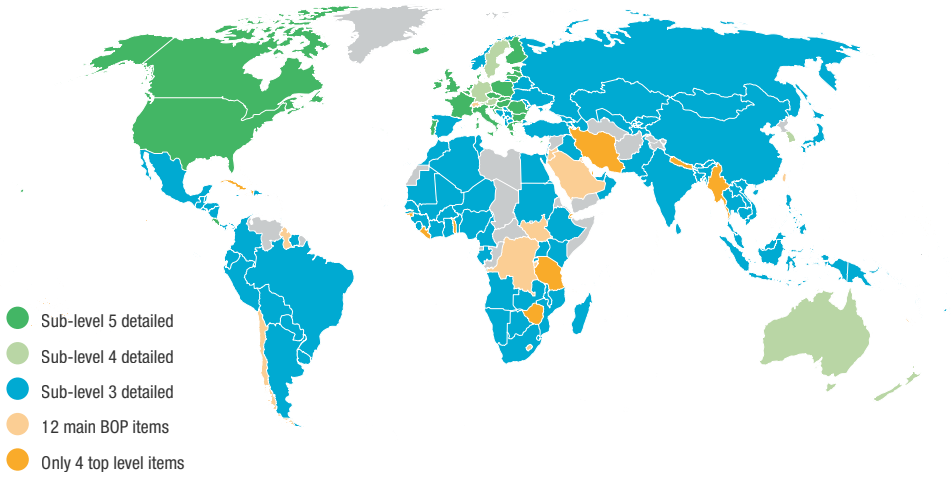
While ITRS is still being used as a source of services trade data in many countries, it is gradually being phased out due to limitations in capturing the detailed and nuanced data required for modern trade in services analysis (United Nations et al., 2016). For these reasons, countries have moved to using enterprise or establishment surveys as the main data source. Although surveys are costly to deploy, countries often implement dedicated questionnaires for trade in services statistics. The quality of the information collected improves because of direct contact with transactors (enterprises or establishments). Exact transactions, detailed service categories, partner economy information, and modes of supply can be more correctly captured. However, it is necessary to manage the response burden put on the statistical units surveyed and to engage skilled statisticians for data collection and compilation.

Countries also use border surveys (particularly for *travel*), household surveys, financial or credit-card data, mobile-phone records, and administrative information to complement the results obtained from trade in services surveys. Consequently, managing the collection of international trade in services data requires adequate legal and institutional arrangements among different national agencies to ensure cooperation, timely data sharing, and protection of confidential information. Combining various data sources improves the quality of trade in services statistics. New technologies, digitalization of trade and big data present opportunities to assess and potentially incorporate new sources and complement data collected on the ground via surveys.

Given that the collection of trade in services data is complex and relatively costly, there are many data gaps, particularly in developing economies. This hinders relevant economic analysis. Detailed trade in services data is often unavailable. Most developing economies—some 140 out of 154 developing economies covered in the UNCTADstat Data Centre—make the trade in services data available at the level of the 12 main EBOPS items. However, the information is often not available at a more disaggregated level. Figure II.3 shows that, in 2021, only about 90 developing

economies reported sub-items at level 3 (just below the 12 main items level). Even fewer, less than 5 economies, reported details for sub-items at sub-levels 4 or 5.

Figure II.3.
Most developing economies report trade in service with lower level of detail
Level of detail reported for trade in services. (Sub-levels of EBOPS)



Source UNCTAD calculation based on joint UNCTAD-WTO trade in services dataset

Notes: The count of reporting for the year 2021 in annual data and official statistics, as available in June 2024. Data covers 188 economies. The first items level includes 4 top level items: 1. Transport, 2. Travel, 3. Manufacturing services, and 4. Maintenance and repair. The second items level expands to 12 main BOP items. Sub-level 3 refers to direct sub-items of the 12 main items. The full services level classification (EBOPS 2010) can be found in Manual on Statistics of International Trade in Services 2010, Annex I, p. 145-148 (United Nations et al., 2012).

The designations employed and the presentation of material on any map in this work do not imply the expression of any opinion whatsoever on the part of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Table II.1 illustrates the difference in reporting between developed and developing economies and points to close to no reporting by developing economies when it comes to items at the lower levels of the classification hierarchy.

Although a big leap forward has been made in compiling trade in services statistics over the last 20 years, trade analysis requires more data granularity. For the analysis to be pertinent, it is crucial to understand which service products are traded and with which partner economy. Both importer and exporter should be designated in the data. However, developing economies are primarily lagging in terms of trade in services partner-economy statistics.

Very few developing economies regularly publish official bilateral flows, as shown in figure II.4. No more than 8 developing economies publish trade-partner statistics on a regular basis, while a few others publish selected partner-country statistics with less detail or less regularity.

Trade in services statistics by modes of supply of exports or imports are compiled mainly by developed economies. More data has become available in recent years. It is recognized that it is not simple for data reporting entities (surveyed companies) to (i) understand the concepts and (ii) get good information on the mode of supply used in a transaction.

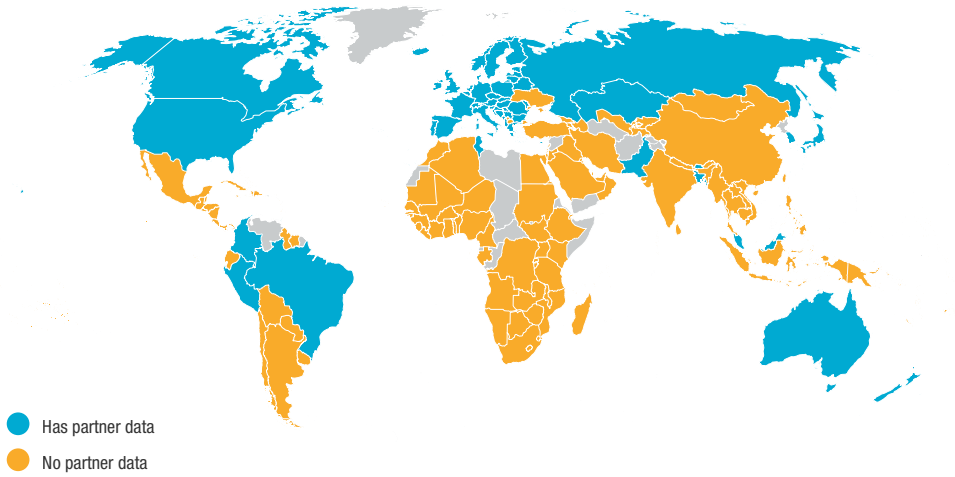
Table II.1.
Trade in services statistics reporting, count for selected items

Sub-level		Developing economies	Developed economies
Number of economies considered		154	50
Total services		150	50
1	**Transport**	150	50
3	Air transport	129	45
4	Air transport passenger	118	40
1	**Travel**	150	50
1	**Manufacturing services**	125	46
1	**Maintenance and repair**	126	48
	Other services		
2	**Construction**	129	49
3	Construction in the reporting economy	72	35
2	**Insurance**	144	50
3	Direct insurance	93	38
2	**Financial services**	139	50
3	Direct financial services	139	50
2	**Charges for the use of intellectual property**	131	50
3	Licences for the use of outcomes of research and development	1	16
2	**Telecommunication, computer, information servcies**	149	50
3	Computer	105	47
4	Computer software	89	47
2	**Other business services**	146	50
3	Professional and management consulting services	113	49
4	Legal, accounting, management consulting…	2	31
5	Legal services	2	28
2	**Personal, cultural, recreational services**	135	50
3	Audiovisual and related services	81	46
4	Audio-visual services	1	9
2	**Government goods and services**	147	50

Source: UNCTAD calculation based on joint UNCTAD-WTO trade in services dataset

Notes: Only a selection of EBOPS-2020 classification is presented for illustration. Categories in bold are 12 main BOP (or EBOPS) classification items. The count of reporting for the year 2021 in annual data and official statistics, as available in July 2024. It covers 204 economies.

Figure II.4.
Few developing economies report bilateral flows for trade in services statistics
Reporters with bilateral flows for 2021 trade in services statistics



Source: UNCTAD calculation based on joint UNCTAD-WTO trade in services dataset

Note: The count of reporting for the year 2021 in annual data and official statistics, as available in June 2024, covers 188 economies.

The designations employed and the presentation of material on any map in this work do not imply the expression of any opinion whatsoever on the part of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

c. Enterprise and establishment surveys for trade in services statistics

Enterprise and establishment surveys are two distinct yet complementary tools for collecting trade in services statistics, each suited for different analytical needs. **Enterprise surveys** target companies, capturing data that reflects the consolidated activities of a business, including all its operational units and locations. In contrast, **establishment surveys** focus on specific units or locations within a company, offering a more granular perspective on economic activities. Both enterprises and establishments are, however, treated as statistical units in a survey. TiSSTAT can be used in both cases and guidance in this technical paper applies equally to both enterprise and establishment surveys also when referred to with the shorthand *enterprise surveys*. (See section III.b on the importance of distinguishing between enterprises and establishments.)

Conducting regular enterprise or establishment surveys brings significant advantages, particularly in the richness of detail they can provide. Unlike other data collection methods, such surveys capture specifics about the types of services traded, the characteristics of the businesses involved, and their trading partners. This granularity makes it easier for policymakers to understand not only the volume but also the composition of trade in services, which is essential for developing targeted economic policies.

Enterprise and establishment surveys provide the most detailed insights into trade in services flows

One of the primary disadvantages of enterprise and establishment surveys is their resource intensity. Since trade in services statistics requires detailed reporting, these surveys may require substantial time to conduct, from the survey design, through data collection, processing and analysis. This can create issues with timeliness and limit the frequency of updates, potentially impacting the relevance of statistics in fast-changing economic environments. The reporting burden on statistical units can

also be high, especially if they are asked to provide detailed information frequently and using methods that are not aligned with their information systems. This can lead to lower response rates or less accurate reporting, challenging data quality. Services are also intangible in nature and some of them may be difficult to link with business accounting concepts. Additionally, on the import side, the complex nature of service transactions and lack of clarity in recording imports of services can lead to reporting inconsistencies, adding another layer of complexity for statistical agencies.

A well-designed survey maximizes the potential of enterprise and establishment surveys while mitigating inherent challenges. TiSSTAT provides an online questionnaire designed to be user-friendly for businesses, simplifying the process of data submission and helping to minimize non-response rates. By offering an intuitive and accessible platform, TiSSTAT encourages greater participation from businesses, ensuring more comprehensive and representative data. Additionally, as a sophisticated software solution, TiSSTAT streamlines survey operations, automating many administrative and analytical tasks. This not only reduces the costs associated with conducting enterprise surveys but also enhances efficiency, allowing national statistical offices (NSOs) to allocate resources more effectively while maintaining high-quality data collection.

Beyond surveys, countries can explore alternative data sources for compiling trade in services statistics. These may include administrative records, tax data, and even analysis of big data (e.g. mobile data or online reservations), which could help complement and cross-validate survey findings. By blending various sources, countries can overcome some of the limitations of enterprise surveys alone, achieving a more complete, timely, and robust dataset on trade in services, while keeping the response burden of statistical units limited. TiSSTAT offers functionality to complement survey results with other sources.

Enterprise and establishment surveys on trade in services are anticipated to expand as countries increasingly recognize the importance of detailed, sector-specific data for economic planning and policymaking. TiSSTAT is designed to adapt to this evolving landscape, offering the flexibility to incorporate new features and functionalities tailored to meet national data collection requirements. This adaptability ensures that TiSSTAT remains relevant and capable of addressing emerging demands, such as integrating new service categories, for instance capturing digital trade, or aligning with updated international standards. The system's development will largely depend on the demand from countries seeking enhanced tools to strengthen their trade statistics. TiSSTAT is a scalable solution for the growing complexity of global trade in services.

1. Suitability of enterprise and establishment surveys per service category

What follows is a summary of the role of enterprise and establishment surveys in each of the twelve service categories defined in the EBOPS. Each category is referred to by its SDMX code to ensure clarity and alignment with international frameworks.

a. SA, SB: Manufacturing Services on Physical Inputs Owned by Others and Maintenance and Repair Services not Included Elsewhere

Enterprise surveys are the primary source for collecting data on manufacturing and repair services, as they can directly capture the value of fees charged for these activities. Alternatives such as the ITRS and customs data may provide supplementary information but often lack the granularity needed to distinguish service fees from goods transactions.

b. SC: Transport Services

Data on transport services presents unique challenges, particularly for freight transport, where BoP recording rules require free-on-board (fob) reporting. Cost, insurance, and freight (cif) values must be converted to fob. Enterprise surveys excel in capturing these distinctions, especially from service providers. Complementary sources such as household surveys and border surveys may be necessary for data on passenger transport, particularly imports, while ITRS data often fail to make the required distinctions.

c. SD: Travel

The transactor-based nature of travel services necessitates data collection from a variety of sources to ensure comprehensive coverage. While enterprise surveys of service providers, such as hotels and tour operators, are essential for capturing export data, other sources are required to capture imports effectively. Household surveys, border surveys, and labour force surveys are particularly important for collecting data on expenditures by residents traveling abroad.

Accurately measuring travel services is inherently complex due to the fragmented nature of data sources and the diverse range of expenditures involved, including accommodation, food, and transport. In addition to enterprise surveys, supplementary data from credit and debit card transactions, administrative records, and border surveys are often needed to address these challenges and provide a fuller picture of cross-border movements and expenditures. Innovative methods, such as leveraging mobile phone data or automated vehicle counting at borders, can further enhance accuracy and coverage.

Among all services categories, travel is the one where the advantages of enterprise surveys are the least obvious. The diversity of transactions and reliance on transactor-based data mean that enterprise surveys alone cannot provide a complete picture, making a multi-source approach indispensable for compiling reliable travel statistics.

d. SE: Construction

Enterprise surveys are particularly effective for construction services, especially for differentiating between short-term projects (less than 12 months) and long-term projects (over 12 months) that are treated as resident activities and typically classified under Foreign Direct Investment (FDI), which covers, inter alia, activities related to mode 3. These surveys capture the value of construction activities while complementary administrative data may provide details on government-funded projects.

e. SF: Insurance and Pension Services

Enterprise surveys are essential for collecting detailed data on insurance and pension services. They capture elements such as premiums, claims, and supplements, which are critical for aligning with BoP standards. Imports of these services pose challenges. Information needed to calculate the value of insurance services includes data on premium supplements earned through investments by foreign insurance companies. Since, on the import side, customers of these services do not have access to this information, it cannot be collected through surveys of domestic enterprises. Therefore, it needs a different data source or estimation (United Nations et al., 2012; para 3.159–3.162).

f. SG: Financial Services

Surveys are well-suited for capturing explicit and implicit fees in financial services, such as loan charges and asset management fees. However, distinguishing service fees from interest or principal payments requires modelling techniques, which may extend beyond the scope of survey data.

g. SH: Charges for the Use of Intellectual Property not Included Elsewhere

Licensing fees and royalties for patents, trademarks, copyrights, and software are best captured through enterprise or establishment surveys. These surveys can be supplemented with data from administrative sources, such as patent offices, to provide a more complete picture.

h. SI: Telecommunications, Computer, and Information Services

Enterprise surveys are indispensable for collecting detailed data on IT and telecommunications services. Administrative records, such as data from telecommunications regulators, can provide complementary insights but are rarely sufficient on their own.

i. SJ: Other Business Services

This diverse category, which includes research and development, legal services, and consulting, requires precise survey design to capture the full range of activities. Enterprise surveys remain the primary tool for collecting data, though they may need to be supplemented with administrative data for niche subcategories.

j. SK: Personal, Cultural, and Recreational Services

Enterprise surveys are effective for collecting data on services such as audio-visual production, live performances, and cultural exports. However, administrative data from public cultural institutions or sports organizations may help address coverage gaps.

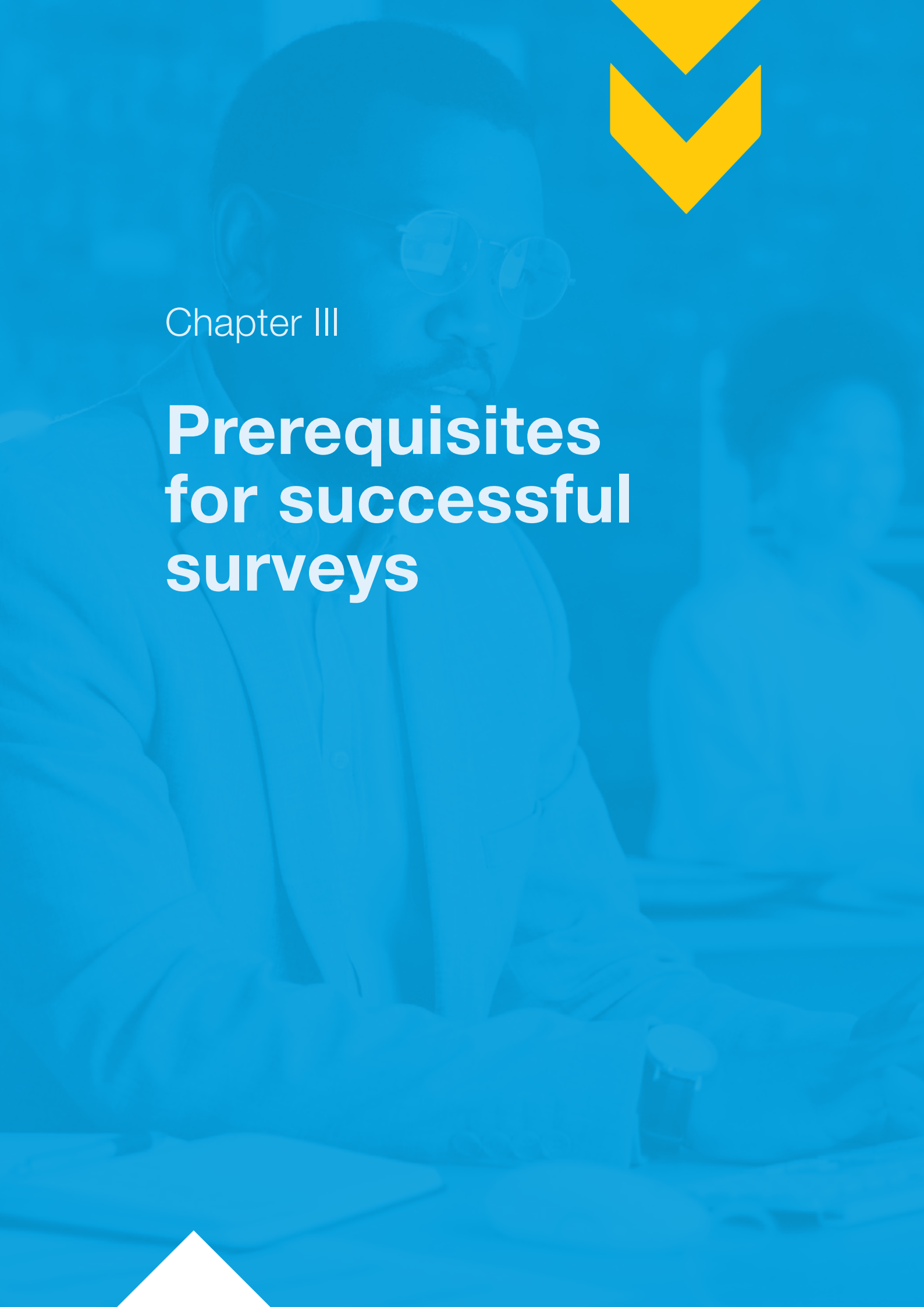
k. SL: Government Goods and Services not Included Elsewhere

Administrative data is the primary source for transactions involving government units. However surveys are suitable for capturing trade with embassies and military enclaves. Surveys targeting these units, particularly their staff and dependents, are necessary to supplement administrative data.

2. Suitability of enterprise and establishment surveys for FATS

Enterprise surveys are indispensable for collecting data on inward FATS. These surveys capture variables such as turnover, number of employees, and value-added contributions by foreign affiliates. Foreign affiliates' local sales of goods and services are of particular interest for trade, especially if services and goods sales can be separated. To ensure comprehensive coverage, survey data is often supplemented with administrative sources, such as business registers, to identify foreign-controlled entities.

However, the same enterprise and establishment surveys are not equally suited for collecting outward FATS data, which pertain to economic indicators for foreign affiliates owned by domestic enterprises but operating abroad. Since the activity of interest, by definition, takes place outside the domestic market, foreign affiliates abroad would not be covered by surveys conducted among domestic establishments. Collecting outward FATS typically requires direct reporting by multinational enterprises or cooperations with foreign statistical authorities.



Chapter III

Prerequisites for successful surveys

To maximize the effectiveness of TiSSTAT implementation, it is essential to consider certain preconditions specific to the national context. Clearly defining the statistical mandate, framework, and institutional arrangements in the country is essential before conducting any survey. Crucially, the validity of the survey relies directly on the accuracy of the sampling frame, and the most effective way to address this challenge is through a comprehensive and up-to-date business register. Survey institutions should also plan proactively to ensure that a successfully implemented survey can be replicated in future years.

TiSSTAT is a powerful modern tool which enables the production of country-owned high-quality and internationally comparable trade in services statistics while limiting initial investment costs significantly as well as reducing the cost of conducting surveys. While adopting and implementing TiSSTAT can be a straightforward process, countries should consider key institutional and operational preconditions to ensure successful and effective implementation.

a. Statistical mandate and framework

Countries should establish a clear framework for international trade in services statistics, aligned with global standards for statistics on international trade in services that facilitate international comparison of statistics. The conceptual framework of the MSITS 2010, including recommended international statistical standards, plays a central role for developing such frameworks, which empower relevant actors to collect and share data, enforce confidentiality and international standards, ensure resource allocation, and establish inter-agency coordination for high-quality, reliable, and internationally comparable data (United Nations et al., 2016; para 2.1–2.25).

Strong legal frameworks support professional independence and the provision of high-quality statistics. As needed, statistical authorities may consult the Guidance on Modernizing Statistical Legislation (UNECE, 2019) for support.

Typically, statistical legislation should not be too detailed about the surveys to be carried out to avoid frequent changes, but they should provide a strong mandate for statistical authorities to access the necessary datasets held by other authorities and private companies, as well as to collect data needed for official statistics from individuals, households, businesses and other units.

Strong confidentiality frameworks help build trust with respondents which is essential for the collection of accurate data. The law should thus include provisions that restrict the use of collected data solely for statistical purposes, assuring enterprises of confidentiality. Respondents should be informed about the purpose and scope of the surveys for trade in services, and its legal basis, as well as about the uses of the collected data, measures to ensure confidentiality, whether the survey is obligatory or voluntary.

Good collaboration with respondents is key to high-quality statistics. A strong mandate for data collection must be balanced with a responsibility to inform respondents, monitor response burden and take action to reduce it. Some statistical offices have established business advisory boards to enable early consultation with enterprise respondents and their representatives about changes in surveying.

The questionnaire in TiSSTAT includes a dedicated section to communicate the legal context to respondents.

This helps respondents understand their legal obligations while providing reassurance, encouraging them to submit accurate and reliable data, thus minimizing the risk of non-response.

b. Institutional arrangements

Strong institutional coordination enhances data collection, processing, and dissemination

Effective TiSSTAT implementation requires strong institutional structures that enable focused work on trade in services statistics and facilitate coordination across involved government agencies, such as the central bank, NSO and ministries. MSITS-CG recommends a holistic design of data collections (United Nations et al., 2016; ch. 13). Typically, trade in services data are collected by a statistical authority that has a strong data collection mandate and experience in enterprise and establishment surveys, such as the NSO, and in close collaboration with the central bank, but national setups vary. Sometimes the compiler needs to access confidential data held by other authorities for statistical purposes, and if not clearly governed by the statistical law, this could be formally agreed in a Memorandum of Understanding (MoU) to stipulate conditions of secure data exchange from bodies like the customs, central banks, ministries of trade, and regional organizations to the compiler of the statistics. These partnerships help prevent redundant data collection, manage response burden, streamline processes, and enhance data completeness. Parties typically benefit from the increased understanding of trade in services with access to all non-confidential data.

A robust statistical business register is essential for an accurate sampling frame

It is recommended to designate one leading agency—typically the NSO or the Central Bank—to carry out the data collection and coordinate with other institutions engaged in trade in services. For efficient coordination, an inter-agency committee or working group can be formed, especially when introducing a new trade in services survey. This group might include ministries of trade, economy, transport, and finance, tax authorities, customs, immigration, tourism, and chambers of commerce, etc. For instance, collecting data on trade in services requires careful alignment between the BoP approach used by central banks and enterprise surveys conducted by NSOs, as both methodologies provide unique yet complementary perspectives. The BoP measures all international monetary transactions in a specific period. It relies on data from financial institutions to capture cross-border transactions, aligned with international standards, as described in the BPM6 (IMF, 2009). However, data from business surveys add detailed enterprise-level information, products traded and bilateral partner economies. Aligning these two approaches involves a coordinated effort to ensure data consistency and bridge the gaps in each method. For example, both central banks and NSOs can standardize definitions and classifications to ensure that BoP and enterprise survey data are compatible. Regular data sharing, e.g., between central bank and the NSO, joint frameworks, and inter-agency collaboration support the alignment, allowing different data sources to complement each other to provide a comprehensive, reliable picture of trade in services, enhancing the quality of economic analysis and policy decisions.

c. Existence of statistical business registers

A statistical business register plays a central role in accurately identifying enterprises engaged in international trade in services and ensuring high quality of data and efficient production processes. Countries are encouraged to develop and maintain a statistical business register with up-to-date information on business characteristics, such as sector, size, and trade activity. Additionally, creating a specialized satellite register focused on businesses involved in trade in services, as recommended by MSITS-CG (United Nations et al., 2016; para 5.25–5.26), can enhance sampling precision and improve data quality.

The Guidelines on Statistical Business Registers (UN DESA, 2024) define a statistical business register as a regularly updated, structured database of economic units in a territorial area, maintained by a national statistical office. They serve as the sources of basic information for conducting business surveys by providing the populations of statistical units and their characteristics. They also offer links to administrative units, thus enabling the use of administrative data for statistical purposes. Business registers facilitate all linking of business data by providing unique identifiers.

For consistency, countries should align the definitions of statistical units with international standards following the Guidelines on Statistical Business Registers (UN DESA, 2024) which seeks to align with related statistical standards like the SNA. Statistical business registers include data on economic units which comprise legal units, used in administrative data sets, and statistical units. Examples of statistical units are the enterprise, the local unit and the establishment. In most cases, a legal-administrative unit corresponds to a statistical unit, but not in all cases. Defining statistical units accurately is essential for high-quality trade in services statistics.

According to UN DESA (2024), an enterprise is a legal unit that produces goods or services and that has autonomy in respect of financial and investment decision-making, while an establishement is an enterprise or part of an enterprise that is situated in a single location and in which only a single productive activity is carried out or which accounts for most of the value added. Establishments allow for more detailed analysis by activity and location, improving the accuracy and relevance of economic statistics, especially in areas like trade in services where the local characteristics of production are significant. The definition of enterprises and establishments directly impacts sampling strategies by determining the level of detail and focus of the data collection.

For example, sampling at the enterprise level may be ideal for understanding high-level business strategies, cross-industry activities, and overall financial performance. However, sampling at the establishment level is more effective for capturing localized data, such as specific service exports, production output by industry, and employment levels within particular sectors. This distinction is especially relevant in trade in services surveys, where certain service activities might be concentrated in specific locations rather than across the entire enterprise. TiSSTAT can be used for both enterprise and establishment surveys and the questionnaire includes questions to verify whether the statistical unit should be considered an enterprise or an establishment (see Annex A).

A comprehensive statistical business register is essential for capturing the businesses that import and export services to the sampling frame, and integrating information from administrative sources, such as customs, central banks, and tax authorities. TiSSTAT includes a module for designing survey samples within distinct sampling frames. Based on specifications of that sampling, TiSSTAT extrapolates results from sample to sampling frame. The adequacy of that extrapolation rests on the adequacy of the sampling frame which is best ensured though the use of a detailed and up to date business register.

d. Achieving sustainable survey practices

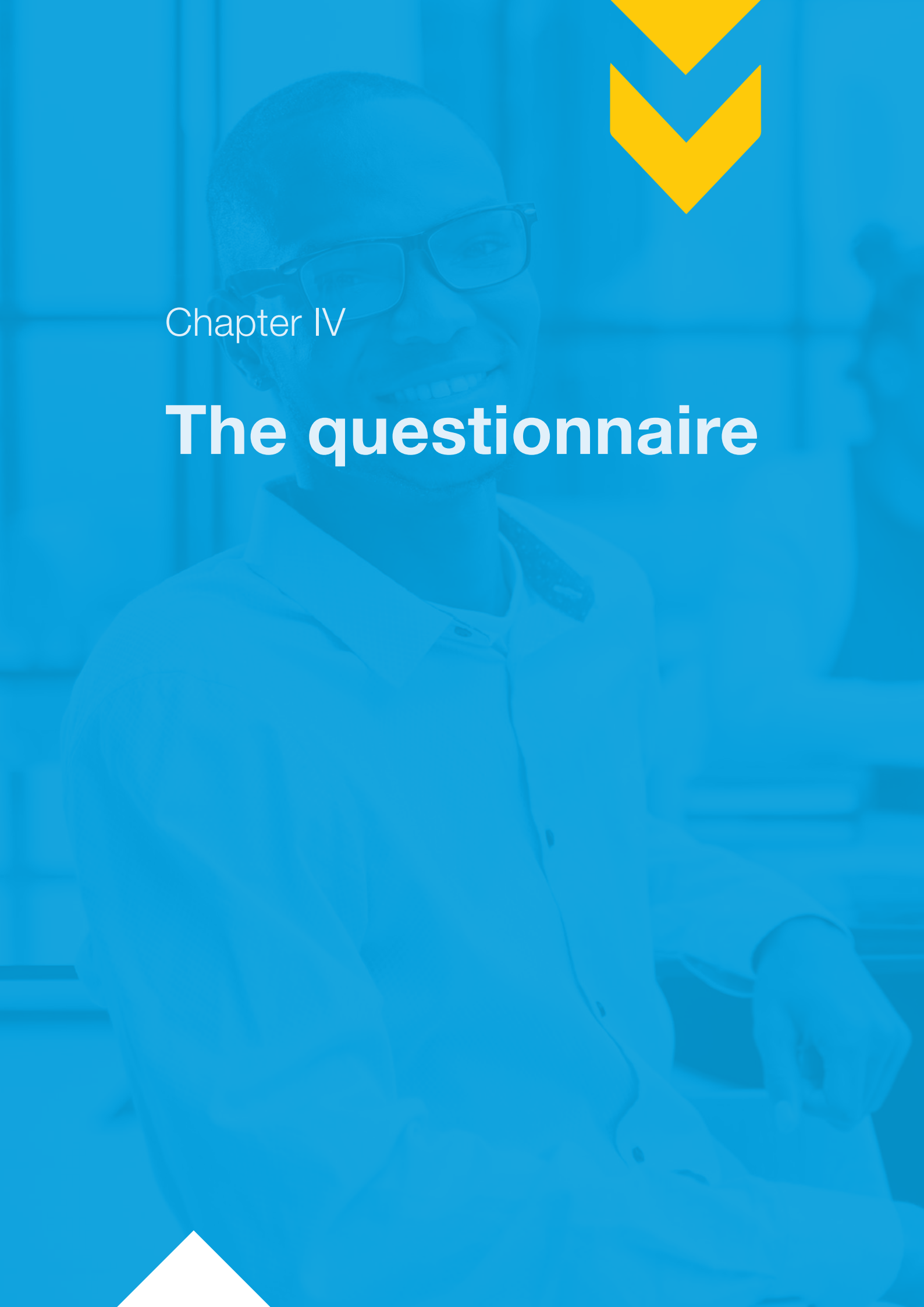
The compiler of international trade in services statistics needs to have regular resources to carry out recurring data collections of high quality, compile the statistics and disseminate them. Establishing a dedicated team and budget line for trade in services survey operations—covering survey design, data collection, processing, and validation—facilitates effective planning and ensures continuity and minimizes the risk of interruptions that could impact data accuracy and timeliness. A sustainable

funding model also enables the adoption of modern methodologies, technologies, and staff training programs, ensuring that the statistics remain relevant for country's policy needs and aligned with international standards and best practices. TiSSTAT provides a modern tool for data collection, compilation and dissemination and can thus help countries enhance their capacity with notably lower costs. The use of TiSSTAT can be supported by a regular programme of e-learning courses on trade in services statistics compilation and use.

Demonstrating the return on investment—such as how robust trade in services data supports evidence-based trade policies and enhances international competitiveness—can help justify the necessary resources. Additionally, countries might explore partnerships with regional and international organizations to obtain supplementary funding and technical assistance, ensuring that trade in services statistics remain reliable and sustainable over time.

Investing in skilled staffing and knowledge transfer is essential for the effective collection of trade in services data. Statistical authorities should be staffed with personnel trained continuously in the specific skills needed for data collection, analysis, and management related to trade in services. This includes technical competencies like survey design and data validation, as well as specialized knowledge of international trade in services standards. Providing ongoing training opportunities allows staff to stay current with best practices and emerging methodologies, ultimately enhancing data quality and alignment with international standards.

To build lasting capacity, countries should adopt knowledge transfer practices that retain expertise within agencies despite potential staff turnover. Mentorship programs, detailed procedural documentation, and cross-training among departments embed knowledge institutionally, ensuring continuity. Partnerships with international organizations for training can also facilitate valuable knowledge exchange and skill-building. By prioritizing skilled staffing and sustainable knowledge transfer, countries can create a stable, competent workforce, securing high-quality trade in services data for the long term.



Chapter IV

The questionnaire

The TiSSTAT questionnaire was developed in collaboration with the UEMOA Commission for implementation across UEMOA countries. Its design was informed by a thorough desk review to ensure its relevance and utility, and enriched by consultations with NSOs of experienced countries to incorporate their expertise and insights. The questionnaire encompasses all EBOPS service categories, excluding Travel, and includes detailed sub-items for each category. The questionnaire provides disaggregation by partner for all items and incorporates disaggregation by mode of supply, following the simplified allocation recommended in MSITS.

The survey questionnaire forms the basis of TiSSTAT. In fact, in its development, the questionnaire came first, and the multi-user application was developed to leverage the strengths of the questionnaire. As the questionnaire is such an integral part of TiSSTAT, it merits its own chapter. The questionnaire also determines what results can be calculated in the application and it is therefore appropriate to start the discussion about TiSSTAT with the questionnaire.

a. History of the questionnaire

The development of TiSSTAT was initiated in response to a request from the Commission of the West African Economic and Monetary Union (UEMOA) to enhance the collection and analysis of trade in services statistics among its member states (UNCTAD, 2024e). This partnership focused on developing a harmonized methodology and system to enhance services trade data quality and comparability across the region, supporting informed policymaking and regional integration in line with international standards.

The aim of the project was to align the system with international standards and best practices, ensuring its relevance and feasibility for all member states of the United Nations. To this end, UNCTAD collaborated with the Central Bank of West African States (BCEAO) and national statistical offices. The initiative not only addressed the specific needs of the UEMOA region but also set a precedent for developing a harmonized, scalable solution that could be adopted globally.

UEMOA countries chose an enterprise survey for measuring trade in services to align with the BCEAO and its existing data collection efforts for BoP statistics and provide more granular data to fully understand the nuances of services trade in the region. MSITS 2010 (United Nations et al., 2012) outlines the need for detailed data by service type, trade partners and mode of supply which BoP statistics typically do not cover. Conducting a survey using the TiSSTAT questionnaire provides data that allows this granularity.

To ensure the TiSSTAT questionnaire effectively met the project's objectives and was aligned with international best practices, a comprehensive desk review was conducted. This review examined methodologies employed by various countries for collecting trade in services data, focusing on enterprise surveys. By analyzing these diverse approaches, the review provided valuable insights into practical implementation, data granularity, and alignment with international frameworks. The table below summarizes the key findings of the desk review, highlighting country experiences and practices that informed the design of the TiSSTAT methodology. See table IV.1 for the main insights of the desk review.

Table IV.1.
Key insights from desk review of available national questionnaires for trade in services data collection, as of 2018

Data collection method	Key advantages	Challenges	Relevance to TISSTAT
United Kingdom, New Zealand			
Surveys on trade in services covering imports and exports with detailed breakdowns by service categories and partners.	Comprehensive coverage of service categories. Clear step-by-step approach: totals first, then details by subcategories or partners.	Complexity in completing detailed surveys. High response burden for enterprises.	Provides a structured approach to capturing service trade data, starting with totals for partners and diving into details if necessary.
Switzerland, France			
Surveys with options for e-survey or post submissions, focusing on "main activity" of the enterprise.	Flexibility in response methods (e.g., online or post). Emphasis on understanding the enterprise's primary service activities.	Lack of country-specific trade details in Switzerland. Potential ambiguity in defining the main activity.	Useful for categorizing enterprises by their primary service activity and reducing the response burden.
Canada, Denmark, Ireland, Sweden, Italy			
Detailed surveys with clear definitions and instructions provided to respondents.	Clarity in concepts and terms reduces misinterpretation. Adherence to MSITS 2010 standards ensures international comparability.	Lengthy instructions might discourage participation. Complexity for respondents unfamiliar with terms.	Highlights the need to include user-friendly definitions and instructions in TiSSTAT to aid comprehension and accuracy.
United States, Australia			
Surveys designed to capture total values and breakdowns by selected services and regions.	Effective for regional analysis of trade data. Focus on specific service types ensures data relevance.	Requires careful categorization to avoid overlaps or omissions. Data quality depends on regional classification clarity.	Emphasizes the value of including regional detail in TiSSTAT for analytical depth.
Singapore			
Not detailed in the notes, but implied focus on structured and clear service categories.	Likely adopts similar practices to UK and New Zealand, focusing on total values followed by partner-specific details.	May share the same challenges as other detailed surveys, such as response burden.	Reinforces the importance of adopting well-defined service categories for clarity.
Australia (Australian Bureau of Statistics - ABS)			
The Survey of International Trade in Services (SITS) collects data directly from enterprises engaged in international trade in services. The survey targets enterprises identified through a mix of alternative sources (e.g., business registers, industry associations, and ABS intelligence). It focuses on services not covered by alternative administrative sources.	Comprehensive coverage of service types where no other data sources exist. Adherence to international standards (BPM6, MSITS 2010, EBOPS 2010) ensures comparability. Detailed stratification of enterprises based on service trade activity improves precision. Regular and consistent data collection (quarterly) from key enterprises ensures up-to-date statistics.	Limited by the absence of a comprehensive list of enterprises engaged in trade in services. High response burden for large enterprises with continuous quarterly enumeration. Dependence on indirect methods (algorithms, profiling) for identifying in-scope enterprises introduces potential biases	Highlights the importance of targeting specific service categories where alternative data sources are unavailable. Emphasizes the need for clear international alignment and regular data collection for reliability.

Note: This table provides the main advantages and challenges of each country/group of countries considered to inform better decision making for establishing TiSSTAT questionnaire. Countries listed in this table may have overlapping practices that were not presented. The presentation here focuses on practices that inspired the establishment of the TiSSTAT questionnaire. There were bilateral consultations with these countries' NSOs and other agencies discussing lessons learned. The development of TiSSTAT questionnaire benefited from an extensive consultation in particular with the Central Bank of France. This list is not exhaustive and may be expanded in further work.

The UEMOA region highly benefits from international services trade, especially in sectors such as banking, telecommunications, and tourism, and the added information that enterprise surveys provide allows the countries to more fully take advantage of the uses of trade in services statistics outlined in section II.b.

It was decided to exclude travel services from the enterprise survey questionnaire since travel data are typically collected from individuals consuming the services rather than from enterprises. Travel is often a personal expenditure, and the data required to track the trade in travel services often comes from various household or border surveys. (See section II.c.1 on the suitability of enterprise and establishment surveys per service category.) Separately from the enterprise survey implemented in TiSSTAT, UNCTAD has worked with the UEMOA commission and the BCEAO to find appropriate solutions for collecting reliable travel data in the context of UEMOA member states.

b. Features of the questionnaire

The TiSSTAT questionnaire is designed for a general survey among enterprises. While the MSITS-CG (United Nations et al., 2016) highlights the value of focused surveys to achieve specificity without overwhelming respondents, TiSSTAT achieves this by leveraging the interactive design of the electronic questionnaire. In its electronic format, the questionnaire dynamically selects questions based on the respondent's inputs, effectively transforming a general survey into a targeted one. This interactivity makes it possible to collect detailed data while reducing unnecessary complexity for respondents. (See section V.d.)

A general survey has an advantage over a focused surveys in collecting data on imports because the types of services that an enterprise imports often have a weaker correlation to its main activity compared to its exports. For example, a software development company may primarily export IT services directly related to its core activity, but it might import a diverse range of services, such as legal consultancy, marketing, and transportation, which are less tied to its business focus. By including imports of all service categories, the TiSSTAT questionnaire provides a broader view of how enterprises engage in international service transactions. However, it should be acknowledged that even a general survey among enterprises or establishments may miss some imports of services that are heavily consumed by households or private individuals. With digitalization, more and more individuals are providing and consuming services internationally.

The primary version of the TiSSTAT survey is an electronic questionnaire, optimized for online use to enhance data accuracy and usability. A paper version also exists for respondents or compilers who prefer traditional methods. However, the electronic version remains central to TiSSTAT's design, taking full advantage of the potential offered by online questionnaires. To maintain consistency, the paper questionnaire aligns with the structure of the electronic version, ensuring compatibility between the two formats.

An interactive electronic questionnaire ensures relevance while minimizing respondent burden

The questionnaire is divided into three main parts, providing a logical structure for collecting information: Part A collects general information about the enterprise or establishment; part B focuses on collecting data on the value of internationally traded services by service category; and part C addresses breakdowns of the values reported in part B. We present each of the parts below. In the electronic version, the design ensures a seamless transition between part B, which collects totals per service category, and part C, which gathers breakdowns.

Part A collects general information about the enterprise or establishment. It begins by distinguishing enterprises from establishments and determining their main activity. Questions also identify whether the respondent qualifies as a

foreign affiliate, enabling the estimation of Inward FATS for indicators such as turnover and the number of employees.

Basic information about the enterprise is verified, including whether it was active during the year and whether it engaged in transactions with non-residents. Respondents answering "no" to either of these questions are not required to complete parts B and C. Additionally, respondents are prompted to identify the service categories in which they engaged in international trade, whether as imports or exports. In the electronic questionnaire, this feature dynamically selects the relevant questions, reducing respondent burden while ensuring detailed data collection. (See Annex A for items in part A.).

TiSSTAT's questionnaire enables trade breakdowns by partner country and, where relevant, by mode of supply

Part B focuses on collecting data on the value of internationally traded services by service category, following detailed items in the EBOPS classification. All EBOPS service categories except Travel are included.

Questions are given codes where the prefix corresponds to an official SDMX code in the EBOPS classification. Questions are in some cases split into subcomponents indicated by an underscore. This strategy is particularly useful for providing additional detail in cases where broader categories may obscure specific types of services. For example, certain types of transport services may be disaggregated into freight and passenger transport to meet the needs of specific countries or users.

TiSSTAT's questionnaire covers all EBOPS service categories except travel

In categories such as insurance and pension services, the questionnaire collects individual elements—such as premiums, claims, and premium supplements—rather than asking respondents to calculate the overall value of the service.

This method is particularly effective for imports, where respondents may not have access to all the necessary details, such as the revenues derived from premium investments by insurance providers.

Furthermore, the questionnaire ensures that distinctions are made between services treated differently under various frameworks. For instance, construction projects lasting more than 12 months are classified as mode 3 transactions (commercial presence) and excluded from international trade statistics in the balance-of-payments framework. See Annex B for items in part B and subsequently in part C.

Part C addresses breakdowns of the values reported in part B. Respondents are asked to distribute these values by partner country and, in some cases, by mode of supply. The need for mode of supply breakdowns is guided by the "Simplified Allocation of FATS and Balance of Payments Data to Modes of Supply" in table V.2 of MSITS 2010 (United Nations et al., 2012). Services such as construction, insurance, and telecommunications often require this level of detail, but respondents are encouraged to report at the level of granularity they can provide. The questionnaire is designed to accommodate both detailed responses and total values, allowing flexibility in data reporting.

The questionnaire also includes extensive help text, definitions and practical examples to aid respondents in completing the survey accurately. These features clarify technical terms, guide respondents through ambiguous categories, and provide specific instructions for reporting partner countries and modes of supply.

Chapter V

TiSSTAT - The Multi-User Application

TiSSTAT is designed to allow users to enter and exit the application at different stages of statistics production, providing flexibility in its implementation. The information system supports the entire survey process, from sampling to reporting, offering a comprehensive solution. TiSSTAT is installed on the survey institution's server and enables secure access for multiple users via internet connections. It includes an electronic questionnaire that leverages interactivity to ask only relevant questions, enhancing response completeness and coherence. TiSSTAT features tools to ensure the quality of compiled statistics, prioritizing reproducibility and confidentiality throughout the process.

The TiSSTAT application is a modular multi-user application designed to make full use of the questionnaire data collected with the TiSSTAT questionnaire. The application is developed for seven distinct statistics production steps: sampling, data collection, data cleaning, survey compilation, survey analysis, data integration and reporting, each with functionality designed to compile reliable, transparent and detailed trade in services statistics. The TiSSTAT application reduces both the response burden for the enterprise and the cost of conducting a survey for the survey institution by offering an efficient, online tool.

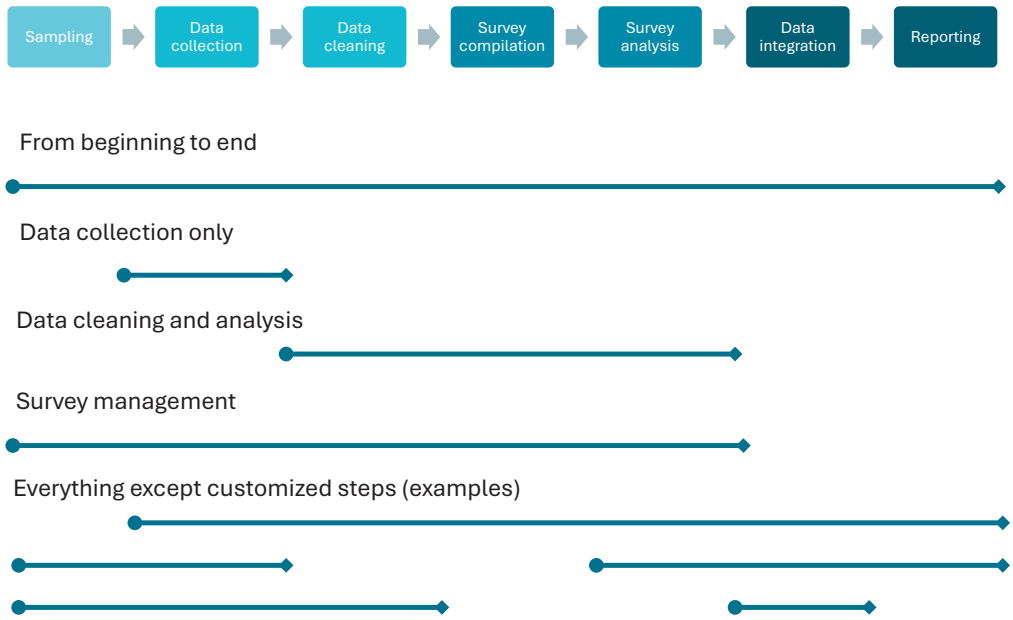
While the principles, methods, and functionalities embedded in TiSSTAT could be applied and possibly extended to many types of surveys, TiSSTAT has been **specifically customized for the compilation of international trade in services statistics.** In doing so, it trades some limitations in flexibility for considerably enhanced utility for compiling trade in services statistics. This chapter helps the reader to better understand the logic of the TiSSTAT application.

a. Main functionality of the TiSSTAT application: flexibility through modularity

TiSSTAT is developed to allow conducting enterprise surveys and compiling trade in services statistics from sampling to reporting. TiSSTAT has been developed with the understanding that users may need or want to perform some of processes outside of the system. To this end, TiSSTAT offers several points of exit and re-entry. The modular approach allows using TiSSTAT for all or only some steps of producing trade in services statistics (see figure V.1).

TiSSTAT is modular, supporting the entire survey process from sampling to reporting

Figure V.1.
TiSSTAT can be used for one or more distinct production steps
Overview of production steps and selection of plausible uses of TiSSTAT



Note. Users work with data at statistical unit level in data collection and cleaning, on stratum level in survey compilation and analysis and as totals for the population in data integration and reporting.

TiSSTAT provides the following modules and functionalities:

1. Sampling

- Upload a sample frame.
- Stratify the sampling frame by size and activity.
- Choose census, random sampling or exclusion per stratum.
- Allocate the number of enterprises sampled per stratum based on chosen algorithm.
- Perform random sampling according to specifications.
- Inspect the adequacy of the sample.

2. Data collection

- Automatically create encrypted links to personalized electronic questionnaires.
- Send personalized emails to recipients, typically including the encrypted link. For example, the survey institution can create specific templates for personalized invitations to respond to the survey as well as separate reminder messages.
- Export data with respondent information to be merged into personalized paper versions of the questionnaire.
- Track progress of the data collection including whether responses are online or on paper.
- Enter data using computer assistance for paper responses or interviews.
- Log contact with the respondents including date and team member making the contact.
- Edit data and automatically log any changes after submission.

3. Data cleaning

- Treat data on statistical unit level.
- Identify inconsistent responses and outliers.
- Automatically treat errors according to predefined imputation methods, selected by the user.
- Track progress on the cleaning process and filter responses to find problematic responses per unit or item.

- Aggregate individual items at the unit level to all levels of aggreagation. For example, calculate top level SC, the sub-levels SC1, SC2, SC3, SC4 as well as all lower-level totals from the items that are asked of the respondent. (See Annexes A and B for relationships between items.)

4. Survey compilation aggregates enterprise data to strata level data

- Aggregate data from statistical unit level to stratum level.
- Aggregate and extrapolate from sample to sampling frame. Calculate estimate and variance.
- Identify aggregated items dominated by one or two units for the purposes of statistical disclosure control in reports.

5. Survey analysis

- Analyse data at stratum and total levels.
- Inspect graphically results in bar and pie graphs, filtered by stratum, flow, service category and/or partner.
- Compare estimates and variances for different sets of results originating from different methodological choices.

6. Data integration

- Move from stratum level results to population level results
- Complement survey data with data for aggregated items that were not part of the survey.
- Override survey results with adjusted or amended data based on other sources than the survey.

7. Reporting

- Produce standardised reports with different levels of detail.
- Apply statistical disclosure control for the ensemble of reports to not reveal data for statistical units dominating a certain service category.

These modules can be used independently or together. Below we present a selection of plausible models on how TiSSTAT can be used, either as a full process tool or for partial functions (see figure V.1).

From beginning to end. TiSSTAT is designed to seamlessly use output from one production step in the next. This is the easiest way to make the most out of the TiSSTAT application.

Data collection only. The data collection module is the most powerful and central module of TiSSTAT. The survey institution can upload a sample and conduct data collection, online or on paper, using TiSSTAT. The result is a structured data file ready for further cleaning and analysis.

Data cleaning and analysis. In this scenario, the survey institution has data collected with the same variables as in the TiSSTAT questionnaire and imports data into TiSSTAT. The user benefits from error detection and the interface that organizes data cleaning. The institution would also be able to use the logged data editing features of the data collection module as well as to select automatic treatments to apply. To be able to do aggregations and extrapolation, the institution would need to supply metrics describing the relationship between sample and sampling frame.

Survey management. TiSSTAT clearly structures data for all steps of the process and offers functionality to log changes and document choices made. TiSSTAT will provide a useful source of raw data and documentation regardless of how the final data are presented.

Everything except customized steps. TiSSTAT is flexible in allowing intermediate files to be exported, edited and then re-imported. This means that TiSSTAT can be used as the main compilation tool but leaves the option open for the user to use a separate tool for one or more of the steps in the process.

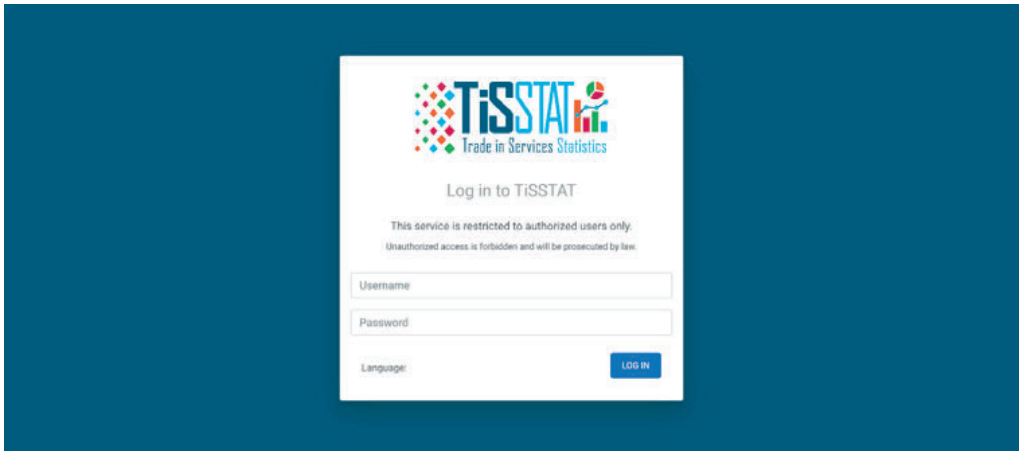
TiSSTAT enables secure, multi-user collaboration across the survey institution for efficient data management

b. Multiple users in multiple roles

TiSSTAT is designed for use by multiple users in various roles, all working simultaneously within the system. One clear role is that of the respondent, whose access is strictly limited to the questionnaire and their own responses. Beyond that, and more crucially, the institution conducting the survey will typically assign multiple people to work on the survey simultaneously.

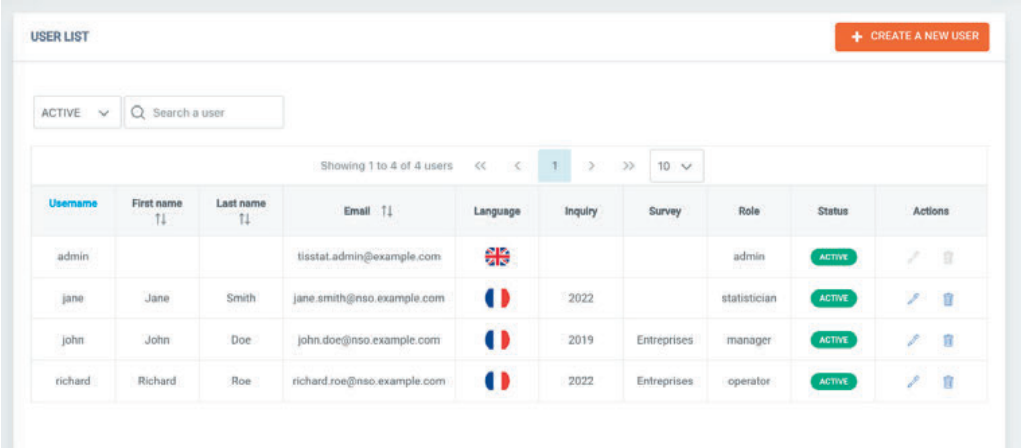
TiSSTAT is installed on the surveying institutions servers and is accessed through secure connections using an internet browser (see figure V.2). This requires the institution to have the infrastructure and capability to host a secure, internet-connected server along with the system's underlying database.

Figure V.2.
TiSSTAT is accessed via an internet browser
Screen shot of login screen



What this allows is an easily managed and fully collaborative effort within the institution. Multiple users can be logged in at the same time, and any actions affecting the survey data are automatically logged with a date stamp and the username. In a version with multiple languages, the user can choose the language of the interface. Additionally, the system administrator can customize access levels for each user, defining which surveys they can access and what role they have in the system which in turn governs which specific operations they are authorized to perform. (See figure V.3.)

Figure V.3.
Multiple users can use TiSSTAT simultaneously with defined roles
Screen shot of list of users with several different roles.



The survey institution has the freedom to define customized roles depending on how they want the application to be used. TiSSTAT comes with some predefined roles that, in turn, illustrate the potential of assigning roles and permissions. (See figure V.4.)

Key-in operator: A user in this role has been assigned the very specific and limited role of data entry. The user has permission to mark in the application a response as received on paper and to enter the received data. Operators are assigned a particular survey and do not have access to other surveys. Nor do they have access to aggregated data or the ability to extract data from the system en masse.

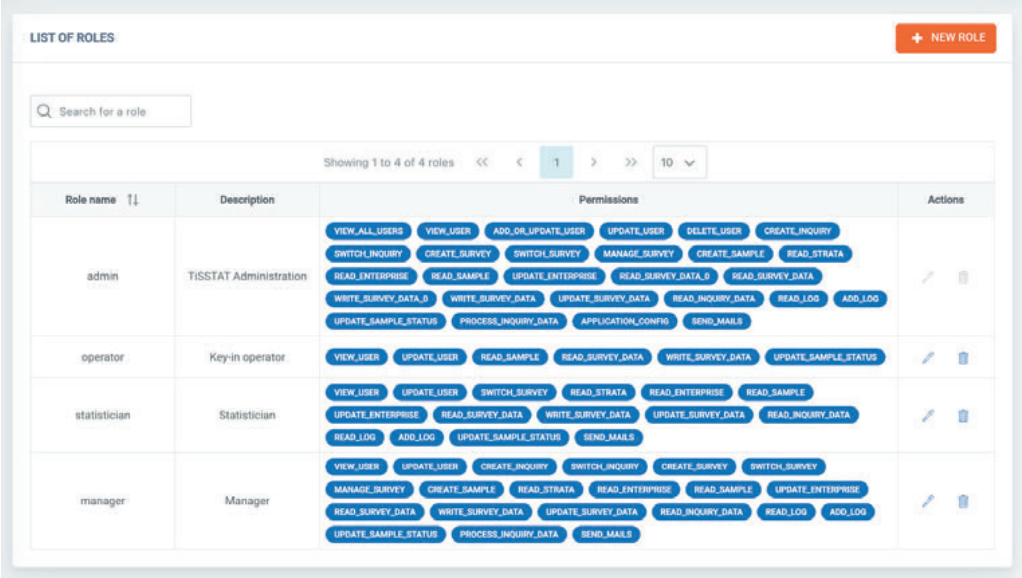
Statistician: The role extends the permissions of the operator to also include permission to send emails, log events related to the enterprise and edit submitted data. This user is also assigned to a single survey.

Manager: Users with this role have, in addition to the permissions of a statistician, the permissions to create new surveys, to freely change between surveys, to prepare the sample, to manage the start and closing of data collection, and to execute systematic operations related to data cleaning, aggregation, extrapolation and publication.

TiSSTAT Administration: A user with this role has all permissions including permissions to create new users and roles, as well as defining permissions for those roles.

These roles can be used as is or customized by adding and removing permissions. A TiSSTAT administrator at the survey institution can make this customization according to the needs of the survey institution.

Figure V.4.
Roles and permissions can be defined by the TiSSTAT Administrator
Screen shot showing configuration of roles

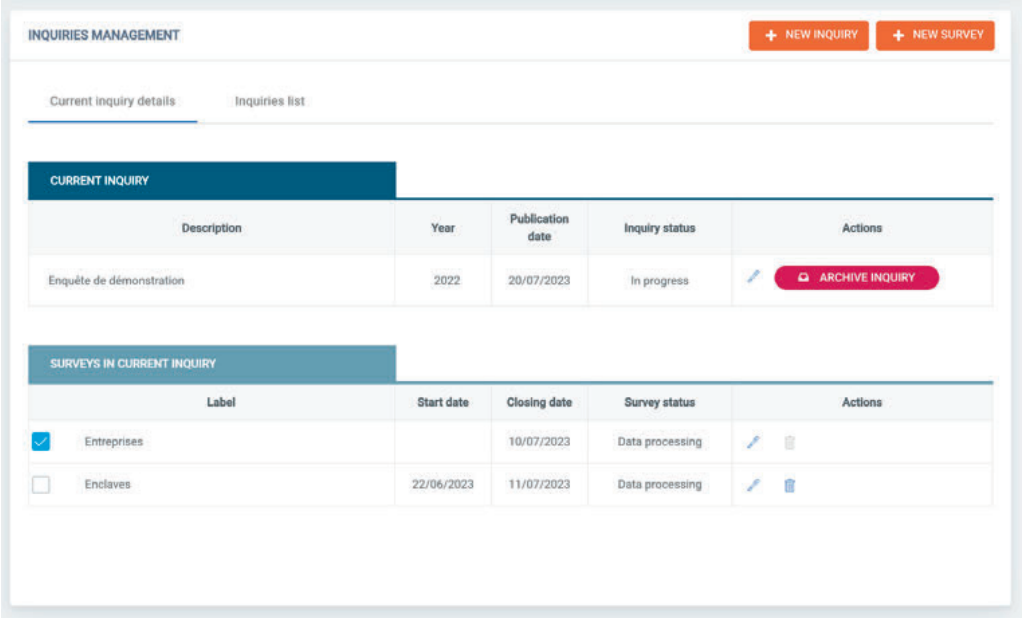


c. Hierarchy of inquiries and surveys

TiSSTAT is intended to be used to annually produce international trade in services statistics. To produce these statistics, the survey institution will combine several data sources with complementing data. TiSSTAT offers the possibility to conduct several independent surveys that can be aggregated into one result and to integrate into those results non-overlapping data that are not collected via the surveys.

It's helpful to think of TiSSTAT as having a hierarchical structure: at the top, there is a comprehensive **inquiry** into trade in services, supported by one or more **additive surveys** with **predefined questionnaires** plus integration of a set of **complementary data** sources.

Figure V.5.
An inquiry for a year can consist of multiple surveys
Inquiries menu with an active inquiry and two surveys within that inquiry



1. Additive surveys

Separate surveys within an inquiry in TiSSTAT are meant to be additive. One use case for this is to have one survey of enterprises and a separate survey of enclaves, such as embassies and foreign military bases (see figure V.5). Conceptually, the surveys can also be viewed as part of a larger survey where enterprises and enclaves are placed in different strata and only the questionnaire administered is adjusted. However, to allow greater flexibility and impose more structure within the information system, we propose treating them as two independent but additive surveys.

Surveys of enterprises and of international enclaves can have distinct sampling frames, different sampling methods, and separate data collection processes, possibly with differing response deadlines. If a manager chooses, they may assign the management of the surveys to different people. Each survey will utilize a distinct predefined questionnaire, and, in the case of enterprises and international enclaves, these questionnaires will differ based on the nature of the statistical units. Different questions will be pertinent for each type of statistical unit (e.g. granting visas is a service primarily performed by embassies).

If desired, users can further divide surveys into additional surveys. Separating an inquiry into several additive surveys makes theoretical sense under the following conditions:

- The sampling frames of surveys do not overlap.
- The time period that the surveys cover is the same.
- The total over strata in both surveys can be aggregated the same way you would total over strata within surveys.
- TiSSTAT also imposes that all surveys in the inquiry use the same currency and unit.

Additionally, note that the imputation methods provided by TiSSTAT are implemented per survey. For instance, if the user chooses to replace a missing value with the average value, which is one of the imputation methods, only the values from the same survey will be considered for imputation.

2. A survey is associated with a predefined questionnaire

In a scenario where an inquiry is made up of several non-overlapping surveys, it is plausible that the different surveys would be directed at different types of respondents. Each of these surveys within the inquiry could be associated with its own questionnaire. The inquiry has a unified set of variables for which results will be prepared but each survey could ask for only a subset of questions. This is the model for specialized surveys that target specific types of enterprises with customized surveys.

At the time of writing, two versions of the TiSSTAT questionnaire are defined in TiSSTAT. One is a general survey aimed at enterprises or establishments, and one is a much shorter questionnaire aimed at foreign embassies, international organizations and international enclaves in the country. Questionnaire versions are predefined and developed as an integrated part of TiSSTAT development.

The trade-off between flexibility and customization in TiSSTAT is most evident in the use of predefined questionnaires**.** These questionnaires are developed as complete packages, including rules for accepted values, interdependencies between questions, aggregation methods, and potential for automated data treatment. While TiSSTAT has been designed with the potential to extend to other surveys, its internal structure and intended use mean that any such extension entails the development of a new predefined questionnaire, complete with its own rules and logic.

3. Integration of complementary data

TiSSTAT offers data integration of the two types MSITS-CG (United Nations et al., 2016) mentions in chapter 13: data *consolidation* and *merging*. In both cases, complementary data provides data not available via the survey to create a complete set of results. It does not entail comparing alternative results for the same data points.

Data consolidation consists of summing up non-overlapping results from additive sources. The complementary data that TiSSTAT will anticipate in this regard include data on services in the *Travel* category (SD) which are often collected through separate surveys of persons or households that ask for information on their expenditures while outside their home country (see section II.c.1.c). Another service category that the survey does not cover and is anticipated to be covered by complementary data is *Financial Intermediation Services Indirectly Measured* (FISIM, SG2) which may come, for example, from a specialized survey of financial corporations (United Nations et al., 2016; para 6.50).

Merging also refers to combining data sources but where care needs to be taken that the data refers to the same population of enterprises. Merging is anticipated in TiSSTAT for elements of insurance services (SF). As mentioned in section II.b.1 the element of premium supplements needed to calculate the total value of imported insurance services are not known by surveyed enterprises and need to be complemented with other sources. In contrast to Travel and FISIM where data can simply be added to the survey results, information relevant to insurance services is used to calculate the value of those services, and without these complementary data points, imports for SDMX code SF will be considered incomplete in TiSSTAT.

Importing complementary data in TiSSTAT is restricted to predefined service categories and subcategories. These predefinitions come with assigned codes and rules of consistency. However, as long as there is a predefined service category and code, importing data is not limited to travel, financial and insurance services. Users may go beyond data integration in the complementary sense and overwrite survey results. This will then be treated as data from an external source.

d. Electronic questionnaires

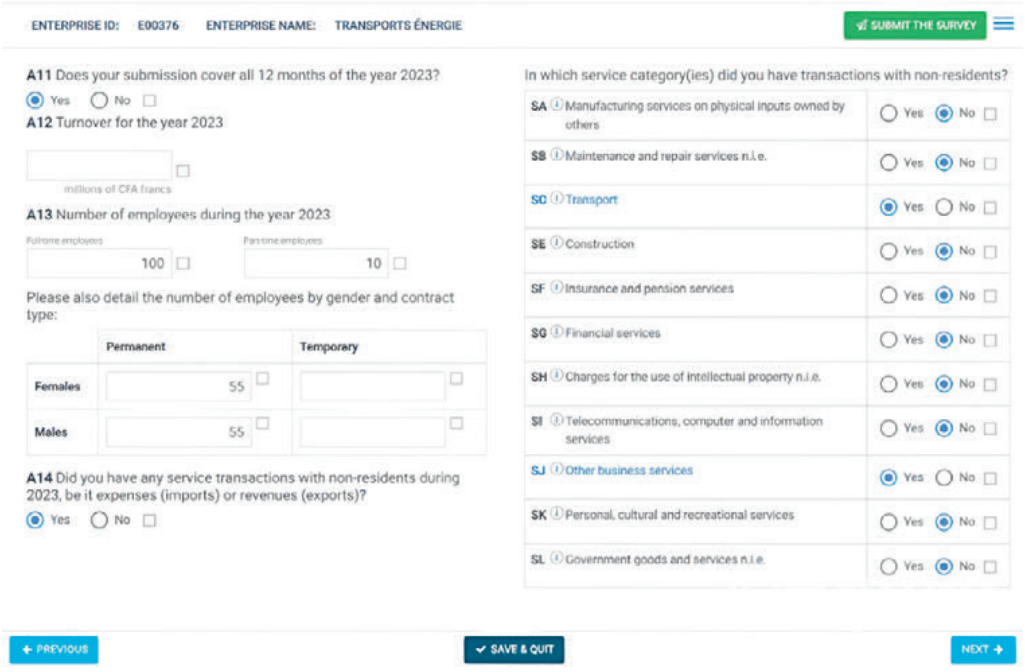
As noted in the introduction, a salient feature of what TiSSTAT offers is that the questionnaire can be administered as an electronic questionnaire. In chapter 21 of MSITS-CG, on the use of information communications technology, the compilation guide notes that this allows computer assisted personal interviewing (CAPI), computer assisted telephone interviewing (CATI), computer assisted web interviewing (CAWI), and internet data collection (United Nations et al., 2016). The electronic questionnaire in TiSSTAT enables all these modes of data collection. For example, in Benin, the NSO provides tablets for interviewers to enter data into TiSSTAT.

The survey institution can print out a paper version of the questionnaire (without the computer assistance offered by the online interface) to send to the respondent per postal mail. Responses submitted via paper can be manually entered into TiSSTAT by operators using the same interface available to online respondents.

Regardless of whether the data are collected through the efforts of an interviewer or through direct reporting by the respondent, the interface makes use of computer assistance to facilitate responding and to add reliability to responses. The interactivity of the electronic questionnaire reduces response burden by only displaying the relevant sections, based on the respondent's answers. For example, question A14 asks respondent if and, if so, in which service categories the enterprise had transactions with non-residents during the year (see figure V.6). Answers to these questions govern what other questions are displayed.

Figure V.6.
The respondent reports categories of services depending on answers to early questions

Enterprise activities page in the TiSSTAT electronic questionnaire

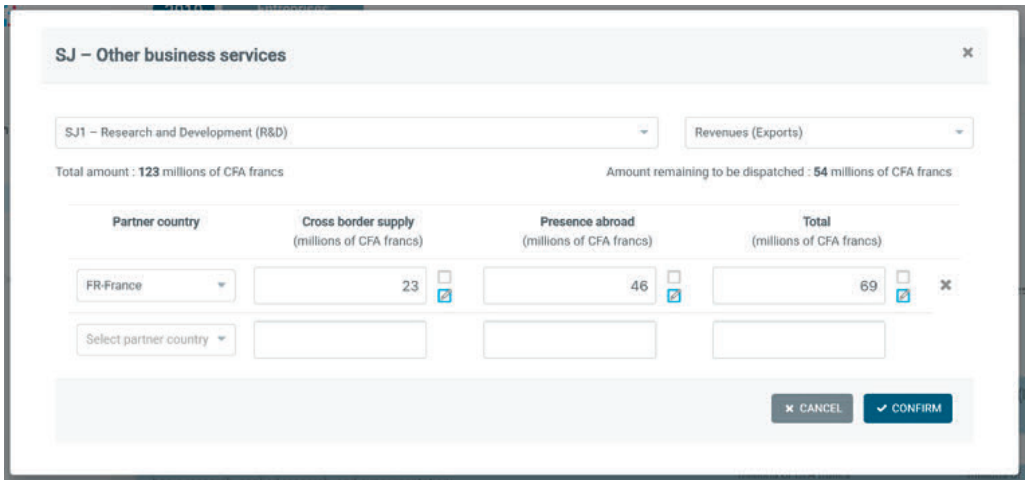


As the electronic questionnaire makes it more manageable to answer questions about international trade in services, it also becomes more feasible to ask for detailed information about that trade. If the ambition is, as it is in TiSSTAT, to collect data for multiple service categories, broken down per partner and in many

cases by mode of supply, it is inevitable that the paper questionnaire becomes intimidatingly lengthy. Even with well thought out design choices, a paper questionnaire has limitations in that it is more difficult to navigate and provides fields for responses that the respondent will never need. Using an electronic questionnaire allows for asking for much more detailed information without these limitations of a paper questionnaire.

The electronic questionnaire in TiSSTAT provides an intuitive interface to break down the total for a specific category or subcategory of services into services traded per partner. Where applicable, this can be further broken down into modes of supply (see figure V.7). The questionnaire asks for breakdown of modes of supply according to the simplified allocation of FATS and BoP data to modes of supply in table V.2 of MSITS 2010 (United Nations et al., 2012). (See also Annex B for indications of items where the questionnaire includes breakdown into modes of supply.) Respondents that do not have detailed information available can enter data on more aggregated levels.

Figure V.7.
Where applicable, the questionnaire allows breaking down values by mode of supply per partner
Interface for breakdown by partner and mode of supply



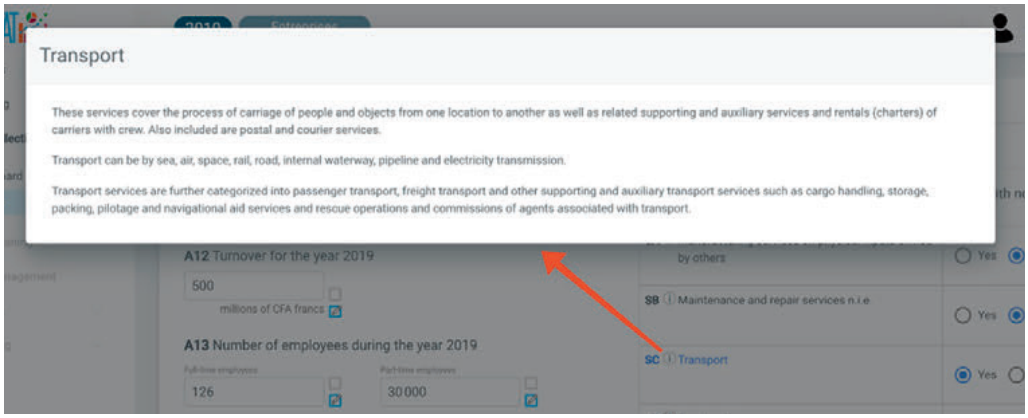
Automated data validation improves accuracy while reducing survey processing time

This interactive questionnaire not only streamlines the process but also enhances the reliability of the data by verifying that responses are complete and coherent in real time. MSITS-CG (United Nations et al., 2016) identifies the use of built-in automatic edits as one of the potentials of electronic questionnaires.

The development and implementation of these rules for checking is a major value added of TiSSTAT. See chapter VI.a for an overview of the data validation rules implemented in the application. TiSSTAT is designed to allow the survey institution to use all data that the respondent provides. We take the view that even inconsistent and incomplete responses can inform imputations and therefore are preferrable to missing data. Therefore, respondents are warned but never prevented from providing and submitting data that the automatic algorithms flag as problematic.

MSITS-CG also notes that electronic questionnaires allow for notes and definitions to be included throughout the questionnaire that helps respondents correctly interpret the questions to provide information relevant to the context of international trade in services. This has the potential to significantly improve data quality (United Nations et al., 2016; para 21.8). TiSSTAT includes multiple examples that are specific to each service category (see an example of help text in figure V.8).

Figure V.8.
Additional help behind information buttons aids respondents
Example of help text about the service category behind an information button.



e. Confidentiality and data security

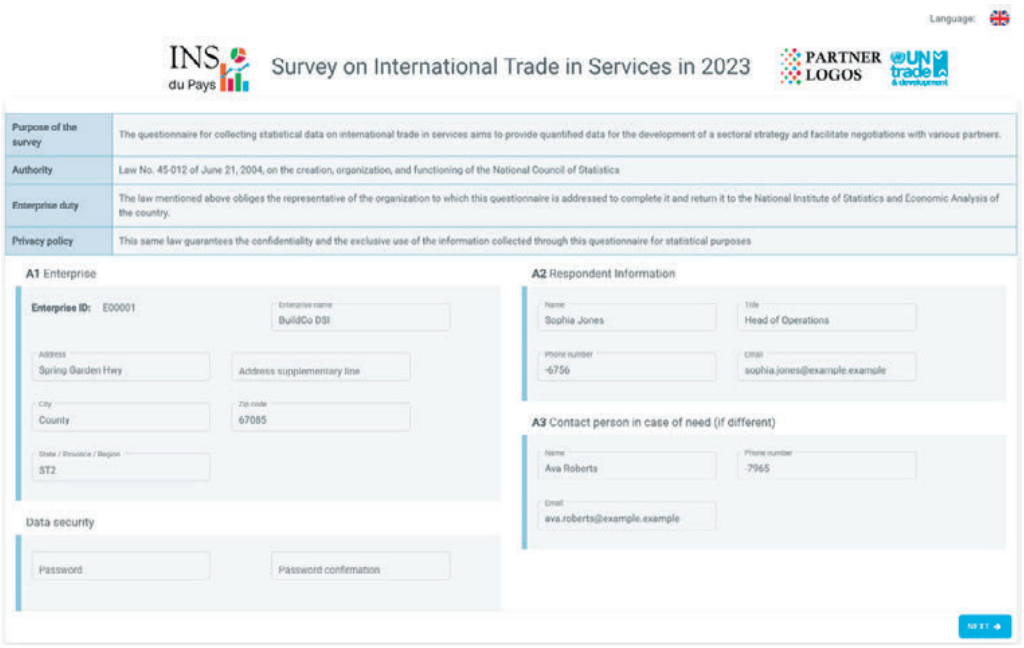
Principles of confidentiality are considered throughout TiSSTAT. The following are features of TiSSTAT where the principles of confidentiality manifest themselves.

1. Data security and confidentiality of respondent data

The TiSSTAT application is designed to be installed on secure servers owned by the survey institution. The institution has full control over the installed version of the application and all data entered into it and can secure the data without third party involvement.

A field is explicitly reserved in the questionnaire for communicating the principles of confidentiality to the respondent. Survey institutions are strongly encouraged to use it (see top of figure V.9).

Figure V.9.
At first visit the user sets a password to allow multiple sessions to complete the survey
First page of the electronic questionnaire with space for confidentiality notice at the top and space for password at the bottom.



Access to electronic questionnaires is provided via personalized and encrypted links created by the application. At first visit, the respondents are asked to create a password to return to the electronic questionnaire if they wish to not complete the response in one sitting. Up until submission, partial responses are treated as drafts and treated as confidential even for the survey institution. Operators at the survey institution can see an indication that a draft is under way but do not have access to the data until the respondent has explicitly submitted the response. Nor do the operators, or anyone else, have access to the password that the respondent created since they are stored as hashes. (Hashes are one-way, irreversible, and unique digital representations of the passwords.)

2. Statistical disclosure control

In generating reports, the survey institution can apply statistical disclosure control for a report that is meant to be public by considering both primary and secondary confidentiality. By primary confidentiality is meant the need to suppress, in the public report, results that are dominated by one or two statistical units. The default setting is that if a single enterprise accounts for 80 per cent, or two units together account for 90 per cent, of the reported value, the total for that cell is hidden. These thresholds can be adjusted in the configuration menu in TiSSTAT by the survey institution.

Figure V.10.
TiSSTAT can suppress report cells to avoid disclosing data from statistical units that dominate the value of the cell

A TiSSTAT generated report *with* statistical disclosure control applied by checking the "public" option.

GRAND TOTALS

EXPORT PUBLIC

	Import (millions of CFA francs)	Export (millions of CFA francs)	Balance (millions of CFA francs)
SA	5777684	366112	-5411572
SB	13795261	1110000	-12685261
SC	88990147	159161196	70171049
SE	38126813	38715727	588914
SF	–	*(Confidential)*	(Confidential)
SG	11285919	23782967	12497048
SH	1613567	237964	-1375603
SI	34623142	21435392	-13187750
SJ	47742331	18592656	-29149675
SK	1169633	21333	-1148300
SL	–	*(Confidential)*	(Confidential)
Total	243124492	339196566	96072074

Secondary confidentiality entails suppressing cells that help derive results for cells where primary confidentiality should be applied (see figure V.10). For example, if one enterprise dominates the exports of *SI1 Telecommunications services* and that result is subject to primary confidentiality, then secondary confidentiality comes into play if the report includes the total *for SI Telecommunications, computer and information services* together with subtotals for *SI2 Computer services* and *SI3 Information services*. Since SI1 can be derived by subtracting the subtotals for SI2 and SI3 from the total SI, more information needs to be suppressed.

When determining secondary confidentiality, the ensemble of disclosed values needs to be considered. This approach, known as 'secondary cell suppression', is a technique to protect sensitive information in tabular data by minimizing the loss of information while ensuring confidentiality. Unfortunately, identifying the optimal set of cells to conceal is an optimization problem whose complexity grows exponentially with the size of the input data. TiSSTAT employs a heuristic algorithm to address the cell suppression problem. This approach avoids the need for expensive computer systems and ensures that the computational time is limited to a few minutes. While not perfect, this solution typically results in an appropriate and near-optimal suppression of cells. If the TiSSTAT algorithm detects any confidential or suppressed data that can be inferred after applying the heuristic method, it will alert the user. Thanks to this unique feature, TiSSTAT ensures that the statistical institution fully complies with its confidentiality obligations. Faced with warnings, the survey institution may suppress additional cells in the set of reported tables to ensure statistical disclosure control across tables. Alternatively, the institution can decide not to publish a particular table to keep other tables in the report intact. This strikes a balance between the ideal and the practical,

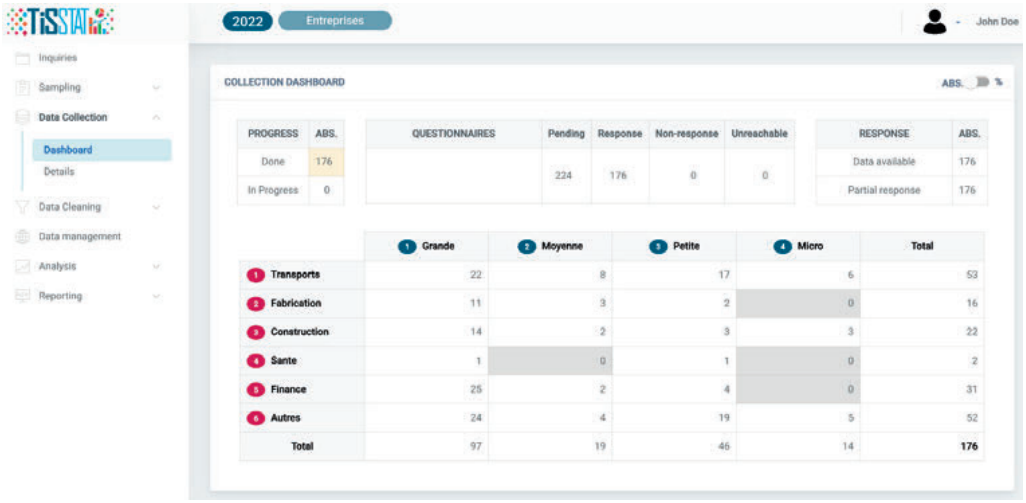
ensuring that the reports produced can be securely disseminated to the public.

f. Stratification and organization of work according to strata

Work conducted in TiSSTAT is in many aspects organized according to strata. Stratification is a central feature of sampling (see Chapter VI on the sampling methodology) but the user interface also allows inspecting and working with data per stratum. The stratification specified by users carries over to the organization of user interface and to functionality of data collection, data cleaning, aggregation and analysis. If the survey institution chooses not to stratify the sample, all data are treated as belonging to the same stratum.

Since it is plausible that the survey institution organizes work by strata, dashboards for data collection and data cleaning as well as the interface to manage data versions are provided by strata (see figure V.11). Lists of enterprises with detailed information for data collection and data cleaning can also be sorted by strata. This makes it possible to assign certain team members to certain groups of enterprises or to prioritize progress for a certain group of crucial enterprises.

Figure V.11.
Users can inspect and work with data per stratum
Data collection dashboard with stratification



g. Standardized and efficient data storage

There are several types of data used in TiSSTAT (sampling frame, strata definitions, reported data etc.). Internally in TiSSTAT, the data format is designed to optimize storage and performance and to avoid floating-point precision error. A floating-point precision error refers to rounding errors due to the fact that not all data points with decimals can be represented exactly in binary form as it is ultimately represented in any computerized system. To avoid this error and to optimize storage, data are stored as integers. This means considerable benefits to the performance of the system at the expense of a small limitation to what data can be entered. The survey institution will set the level of precision in which they wish that the respondents report. The highest possible precision is the unit 1 in the

currency selected. Surveys can be set up to work in other units of higher magnitude depending on the context (hundreds, thousands, millions or billions in the selected currency). To ensure consistency, the unit and currency are chosen for the whole inquiry and results are reported in analyses and final reports in the selected units (decimals are accounted for in intermediate calculations). This approach assures a sufficient level of precision while making the unit clear to both respondents and compilers and optimizing memory usage.

1. Survey response data

One of the most central intermediate data files that the user can import from or export into TiSSTAT is the file containing responses to the survey. The survey responses in TiSSTAT are stored in one single file regardless of whether it pertains to general information about the enterprise (part A), to total imports or exports for the service items (part B) or to data disaggregated by country or by mode of supply (part C). Survey response data are stored with a single value per row with columns identifying the value by enterprise id, question code (which contains information on mode of supply), flow, partner country and fields that indicate the quality of the data. The data format clearly distinguishes between values, keeps files organized, and allows efficient filtering and querying in software outside TiSSTAT.

Data editing produces a rapidly growing number of potential versions of the survey response data. Work is made more efficient by allowing multiple people to work on entering and editing responses simultaneously, but this also puts demands on tracking the potential versions of the data. The approach that is taken in TiSSTAT is to only explicitly store one reference version of the data. The reference version of the data is the latest version after any edits up until that point. This is paired with automatic logging of all changes to data per unit in a dedicated log, starting from submission of data.

The combination of these two measures means that every potential version of the response data is implicitly accessible.

In addition to the reference version of the response data (termed *initial* in figure V.12), a separate version is stored as the result of automatic cleaning (*cleaned* in figure V.12). This is the version that is used for aggregation and processing results. The reference version only includes the set of items that respondents can respond to. Items representing totals for an enterprise (e.g. the total of transport services) are aggregated an included in the cleaned data. The cleaned response data is a product of reference data and the cleaning algorithms that the user selects. When no automatic cleaning is selected, the cleaned data is a copy of the reference data except aggregated items are calculated. This means that the automatic cleaning can be done and redone multiple times without affecting the reference data.

2. Storage of multiple versions of aggregated data

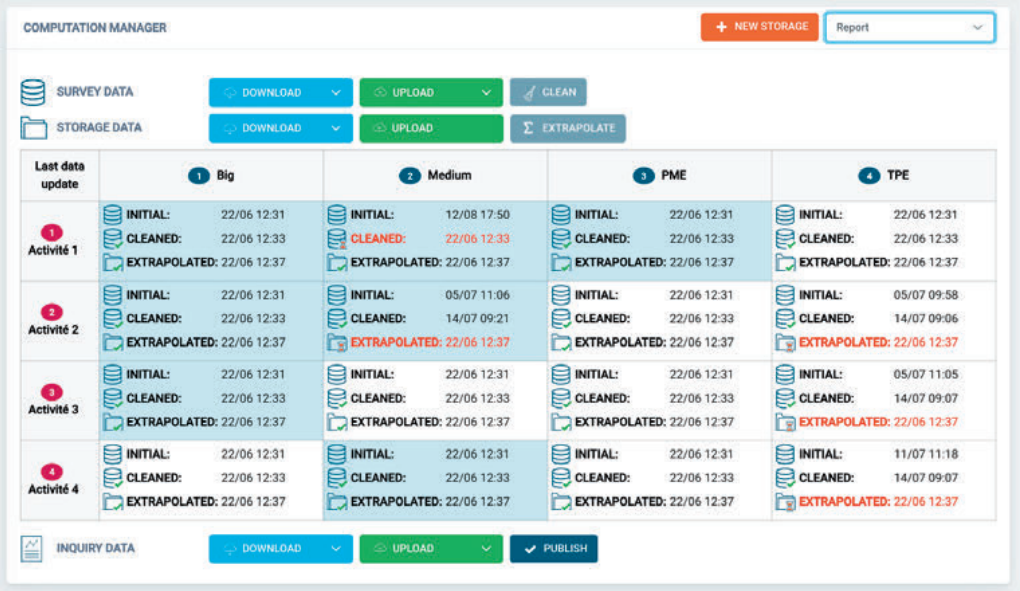
In TiSSTAT, the set of aggregated results are the product of

- the reference data,
- automatic cleaning and
- the extrapolation method used.

By making edits to the reference data, rerunning the automatic cleaning with different settings or switching between extrapolation methods, the users create new versions of the aggregated results. The user can store these different results in what TiSSTAT terms *storages.* This is what allows comparison between different methodological choices and is part of the reproducibility discussed in the next section. The user explicitly chooses one of these versions for publication and the reports are generated from this chosen version. All these operations are done in the Data management menu (see figure V.12).

TiSSTAT optimizes data storage, ensuring efficiency, consistency, and precision in trade statistics

Figure V.12.
Data cleaning and extrapolation can be performed and tracked per stratum
Data management screen



h. Reproducibility

TiSSTAT ensures reproducibility with automated logging, data versioning, and transparent methodology tracking

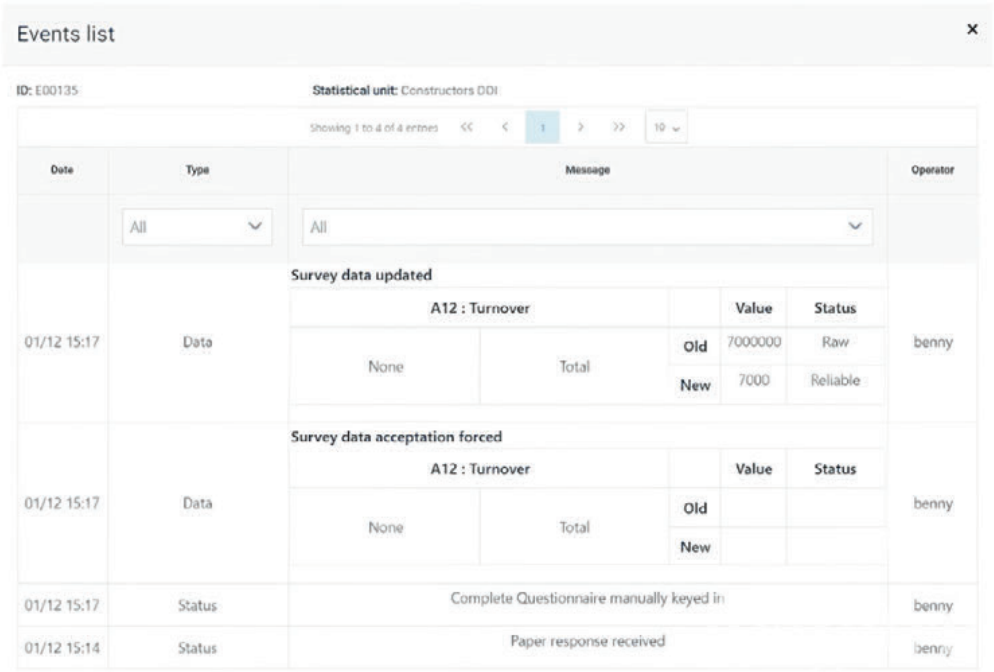
Conducting an enterprise or establishment survey is a complex task that often involves multiple people and evolving circumstances, leading institutions to explore various approaches for handling data to compile the most reliable results. To give the institution the freedom to explore several methods to compile reliable statistics, while assuring the quality of the statistics produced, TiSSTAT places high value on reproducibility. Being able to track qualitatively and quantitatively how the survey was carried out is key to assuring quality of the statistics production (United Nations et al., 2016, chapter 19 on Quality assurance; see also United Nations, 2019). While ensuring reproducibility ultimately rests with the compiling institution, TiSSTAT facilitates it in several ways.

First, all online questionnaire transactions—sending and receiving—are automatically logged by TiSSTAT in the events list for the unit, and operators can manually log any relevant contacts or events associated with a statistical unit.

Second, any changes made to the data after a questionnaire is submitted are automatically recorded in the same events list. This includes changes to the assessed level of reliability of the values (see figure V.13). Automatic checking will flag inconsistent data and users can also manually flag values as unreliable. Independent users can then validate these values and flag them as valid.

Figure V.13.
All changes to submitted data are automatically logged with timestamp and operator

Example of event list showing changes to submitted data

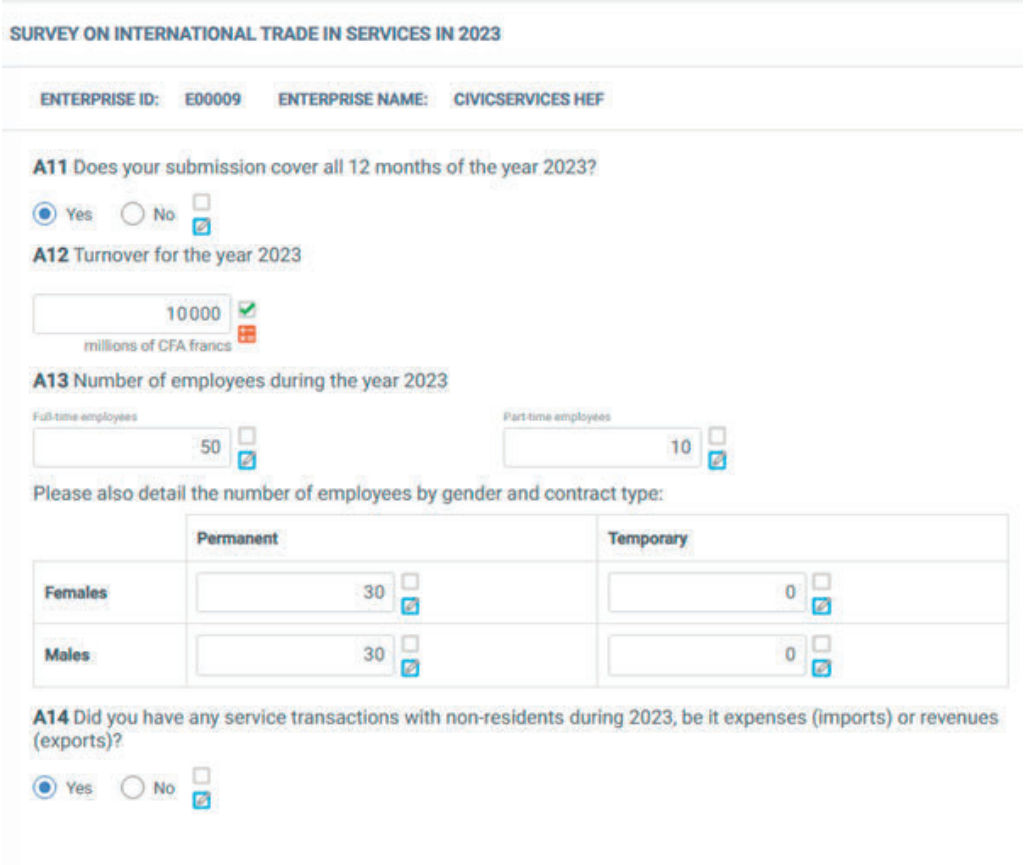


In addition, TiSSTAT distinguishes between three different statuses of the values: *raw*, *reliable* and *estimated*. A *raw* value is one reported by the respondent. A *reliable* value is a value entered by the survey institution but with a high degree of reliability. An *estimated* value is also entered by the survey institution but with a lower degree of certainty. By flagging a value as estimated the user can include the value in aggregates of totals while excluding it from imputation calculations to avoid compounding errors. Automatic imputations made via algorithms programmed in TiSSTAT are also flagged with the status set to *"estimated"* to avoid compounding errors. For example, when an imputation by the mean in the stratum is used, the calculated mean is only based on raw and reliable values.

The two types of flags are designed to allow the survey institution to assign to operators the clear and limited task of entering data exactly as reported. With this task at hand, if the operators have any doubts about the validity of the reported value (be it because it is improbable, the handwriting is unclear or any other reason) the operator can still enter the data but flag the value for later review. An independent user can validate this value (see figure V.14). This way the assessment about the true value is logged with timestamps including the user that initially flagged the problem and who made the final assessment.

Explicit assignment of status of each data point in the responses as raw, reliable and estimated also facilitates producing quantitative measures for data quality (United Nations et al., 2016; ch. 19) and to report these as part of metadata (United Nations et al., 2012; ch.18).

Figure V.14.
The status of individual response items can be clearly communicated
Data entry screen with a value for A12 Turnover flagged as valid and estimated.



Note. The green checkmark indicates that the value for A12 has been manually validated. It takes the place of an error flag. The red icon with arithmetic operators indicates that the value has been assigned the status "estimated".

Third, TiSSTAT allows users to reverse and redo any automatic data treatment as many times as needed, with full flexibility in adjusting the settings. This capability, combined with the system's explicit tracking of which enterprises have responded, and which responses are being considered, empowers users to experiment with different methods to reduce variance. Explicit recording of what enterprises have responded, which responses to consider, the facility to easily redo automatic treatment of responses, and to redo aggregations are all elements that facilitate reproducibility.

i. Clear cutoff points in the survey process

To establish structure in the survey process and to create clear expectations for how TiSSTAT works, the system imposes clear cutoffs of two types: *response drafts vs submitted responses* and *open versus closed surveys*. The definition of these states may differ from how the survey institution would choose to define them and understanding how they are defined in TiSSTAT is useful in order to make most efficient use of TiSSTAT.

1. Draft responses vs submitted responses.

As a principle of confidentiality, online responses remain inaccessible to the survey institution until they are submitted by the respondent. Draft responses are visible only to the respondent and are not permanently stored until they are submitted. This mirrors the process for paper questionnaires, where respondents can review and work on their answers privately. Only when the completed questionnaire is mailed are the responses shared with the survey institution. Similarly, submitting an online questionnaire is equivalent to mailing a paper form; it is at this stage that the respondent explicitly consents to the information being used.

If a respondent starts responding to an online questionnaire, the respondent may save the responses and come back to them at their own preferred time using the password created at first visit (see figure V.9). In the draft state, the survey institution cannot access draft responses. The respondent can return to the draft responses to complete and submit responses up until the survey institution closes the survey. If the survey is closed without the respondent submitting the draft responses, these responses will be erased and never be a part of the survey data just like a paper questionnaire with respondents' responses or drafts would not be considered if they were never confirmed by sending them to the survey institution.

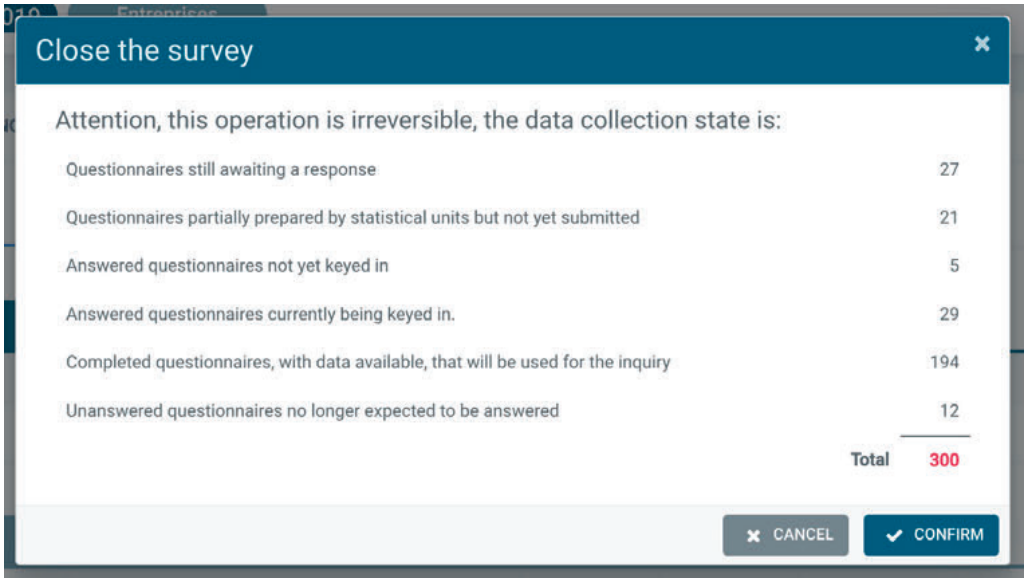
This behaviour is the same when the responses are keyed in by an operator except that, in this case, the questionnaire is only accessible by the operators at the survey institution. An operator can start filling out the questionnaire, save the draft and return to it later. In the draft state, no changes are logged. The task of the operator, in this phase, is to as accurately as possible reflect the answers provided by the respondent. Any changes are interpreted as changes due to corrections by the operator to their own attempt to accurately key in responses. The operator will not attempt to correct any mistakes by the respondent or change any values but may flag responses for later review. When the operator believes that they have accurately entered all responses, the operator submits the responses. At that point the data are stored, and any subsequent change is logged. Access to the responses can also be limited after submission based on what permissions each user is assigned.

2. Open vs closed surveys

Closing a survey has clear consequences. Some of these consequences intentionally limit how TiSSTAT can be used. Some functionality, such as the data cleaning dashboard and automatic treatment of responses are only available after the survey is closed. When the survey is closed, the user has established which enterprises will be considered as providing responses. This is also the point in time when the survey institution no longer expects to receive more responses and respondents' access to the online questionnaire is removed.

Because draft responses are lost if not submitted before closing the survey, care should be taken when closing the survey to make sure all operators have finished their work and sufficient reminders to submit responses have been sent to respondents. TiSSTAT makes the status of the data collection and what data might be lost clear and explicitly warns about this when the survey is closed (see figure V.15).

Figure V.15.
An explicit summary of data available is given before the survey is closed
Screen that shows summary of data available at time of closing



Manual review of responses (with potential changes logged) can start while the survey is still open but the dashboard that tracks the progress of data cleaning is not shown before the number of responding units has been established through closing the survey. The automatic treatment is also not available before it is established, by closing the survey, what data can be considered in imputations based on responses from other units. While no more statistical units are admitted after closing the survey, survey responses can be discarded if judged unreliable during review and cleaning.

j. Customization to context: Language and currency

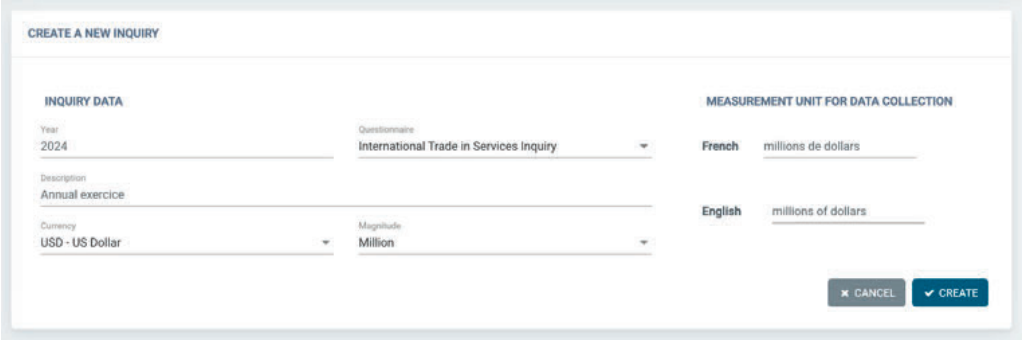
TiSSTAT is designed to be flexible regarding in what context it is used. This includes the language it is offered in, both for the user interface and for the questionnaire.

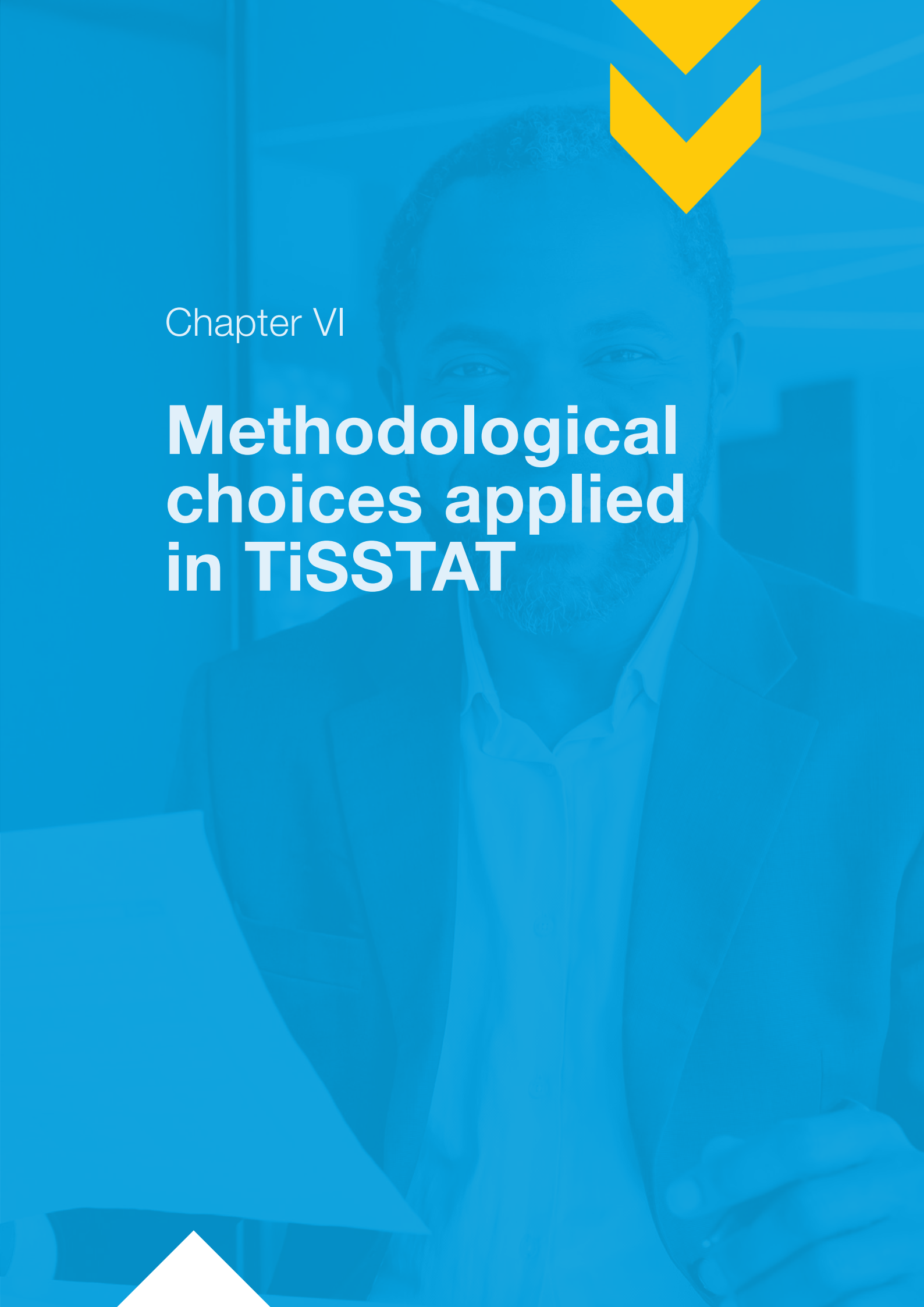
When TiSSTAT is set up for multiple languages, the user at the survey institution and the respondents choose in what language they want to work. The questionnaire is identical in content regardless of language. At the time of writing, TiSSTAT is available in English and in French. UNCTAD has integrated tools to facilitate translation of the user interface and the questionnaire in TiSSTAT. Through these tools, a statistical office can actively participate in the development of the translations needed in the country. Currently, this is how UNCTAD is working together with the NSO in Guinea-Bissau to produce a questionnaire in Portuguese.

As mentioned in section V.g about data storage, the survey institution can also easily customize the questionnaire to their own context by choosing what currency to use and what order of magnitude to use in responses (e.g 1$, 1 000$ or 1 000 000 US$). These settings are set per inquiry, for the sake of consistency, and automatically carried over to the questionnaire in all surveys of the inquiry as well as the examples provided as help in the questionnaire (see figure V.16).

Figure V.16.
The unit of measurement is customized to the local context

Screen with currency and unit settings for the inquiry.





Chapter VI

Methodological choices applied in TiSSTAT

TiSSTAT offers a set of methodological choices that allows conducting a survey from sampling to reporting results. Data validation rules and imputations are defined in relationship to the TiSSTAT questionnaire. Sampling and extrapolation methods are designed with stratification in mind and are internally consistent.

Survey methodology is a rich field (see for example Groves et al., 2009 for a comprehensive overview). TiSSTAT does not offer a comprehensive selection of methods but provides a concrete and clear roadmap for carrying out enterprise or establishment surveys for the purpose of compiling trade in services statistics. TiSSTAT provides an interlinked process defining how the responses in the questionnaire are aggregated to the value of trade in services, extrapolated and reported. The design and content of the questionnaire also guide what specific validation rules to apply and what imputations should be made available for each question.

a. Data validation rules

As discussed in section V.d, one of the advantages that come with electronic questionnaires is the possibility to incorporate interactive checks to assist in entering reliable responses. Checks are extended in the data cleaning phase of the process regardless of how the data were entered. This section presents a descriptive overview of the types of checks performed on submitted data.

Each of following types of checks have multiple rules with specific conditions that, when not met, trigger an error flag for the affected item(s). The user is presented with a single error message per item. This makes possible a clear overview in a dashboard of the number of items that need attention and for what reason at any given time.

- Checks on mandatory values
  - Ensure that required fields are filled. If a mandatory field is empty, this rule flags the item as missing.
- Data consistency checks
  - Validate that values fall within specified acceptable bounds. Flags values outside of defined limits as inconsistencies. These bounds are customizable by the survey institution.
  - Compare totals against their components. Flag discrepancies if the total does not equal the sum of its parts.
  - Check values against expected results based on other entries. Flag any value that doesn't match anticipated results.
- Completeness checks
  - Ensure entries in the services part of the survey where applicable. Flags items of a certain service category as missing if the respondent has indicated the presence of trade in that category without providing details.
  - Ensure that breakdowns by partner and, where applicable, per mode of supply are provided when totals for the service are provided.
  - Verify that the sum of breakdown values matches the reported total.
- Manual flags by users
  - Allow users to mark items as erroneous manually. This error type is not modified by automated cleaning processes.
  - Allow users to mark values as "accepted," bypassing further error checks for that entry.
- Outliers and special cases
  - Flag totals based on partially known or unknown values as incomplete. For example, the total value of Financial services (SG) is considered incomplete without complementary data on SG2 *Financial Intermediation Services Indirectly Measured (FISIM)*.

- Identify values that are outliers, based on bounds typically defined for boxplot fences. A value is considered an outlier if it is outside 1.5 times the interquartile range (IQR) from either quartile 1 or quartile 3. See Box IV.1 for the algorithm to identify outliers.

Box VI.1.
The algorithm for identifying outliers builds on the interquartile range

Outliers are defined as observations 1.5 times the size of the interquartile range (IQR) outside the first and third quartile where

the first quartile (Q1) is the 25th percentile,

the third quartile (Q3) is the 75th percentile and

IQR = Q3 – Q1.

This gives the lower and upper bounds for expected values with

Lower Bound = Q1 – 1.5 * IQR, and

Upper Bound = Q3 + 1.5 * IQR.

A value x is flagged as an outlier if:

x < Lower Bound or x > Upper Bound.

When calculating the bounds the calculations exclude empty responses implicitly interpreted as 0 and values flagged as estimates to prevent skewing the interquartile range or inflating the bounds.

TiSSTAT enhances data quality with automated validation rules and imputation methods for missing values

b. Imputations

The flags produced by the data validation rules described in the previous section govern when automatic imputations are performed. Errors of certain types are associated with given potential imputation methods. The user can prevent a flagged item from being imputed by manually flagging the item as valid. Only imputations selected by the user are performed. They are performed iteratively and in a predetermined order. This effectively means that certain imputation methods have priority over others.

If an imputation method applies to a certain item (determined by specification of item code and the error flag for the value) and the imputation is successful, the new value is introduced with a new status (typically updated to “estimated”). After each imputation the data validation rules are reapplied, and the error flag updated (if the imputation was successful this would be an update to absence of error). If an imputation method was applicable and successful, subsequent imputations no longer apply. Items that are still flagged with errors are still subject to imputations. The order of the imputations presented in the data cleaning interface informs the user about the expected behavior of the ensemble of imputation methods.

Two safeguards are used in TiSSTAT to constrain automatic cleaning from producing inappropriate results. One is the limitation that imputations do not base calculations on other imputed values or values that the users have manually flagged as estimated (see section V.h on reproducibility). This limitation prevents compounding errors. The other safeguard is that TiSSTAT allows users to set a minimum threshold of valid responses needed for an imputed value to be calculated. As an example, setting this limit to 10 means that the

imputation by stratum mean only replaces missing values if a mean can be calculated based on at least 10 available values.

Imputations are selected as groups that may contain multiple steps or related imputations. Below is an overview of the imputation methods available in TiSSTAT v.1.4.3. More imputation methods are planned for development which is hinted by the non-consecutive numbering of the imputation groups. The imputations below are described as if the data needed for the imputation are available. However, part of the algorithm for the imputations is naturally to determine the availability of the needed data. If they are not available, the imputation is not executed. Full specifications also detail conditions that need to be met for the imputation to be activated, the most obvious of which are that the data point is flagged as missing or with an error associated with the imputation method. An important role of the data validation checks above is to identify those data points that are candidates for imputation and explicitly class other observations as values not to be altered.

a. Group 01: Basic cleaning part A

Performs cleaning that will be required for further calculations. Includes the following:

- Compute full-time employees based on details on categories of employees.
- Use turnover from the sampling frame when missing in the responses.
- Use number of employees from the sampling frame when missing in the responses.
- Shrink the enterprise activity breakdown (A7_A – A7_S) to a total of 100% when responses exceed 100%.
- Explicitly assign a single main activity in this priority order:
  - Based on the highest percentage
  - Randomly among tied activities
  - As “not specified” if no data available
- Indicate “Yes” or “No” on A14 *Did you have any service transactions with non-residents during the year?* This imputation is based on other responses implying such transactions.
- Indicate “Yes” or “No” on SF_IC *Is your enterprise an insurance company or a pension fund?* This imputation is based on other responses implying such activities.

b. Group 02: Extrapolate partial period to full year

This relates to question **A11** *Does your submission cover all 12 months of the year?* It includes extrapolating reported values from the reported period to a full year.

c. Group 06: SF. Premiums from supplements or actuarial claims

This is the first of four consecutive groups of imputations that relate to SF *Insurance and pension services*. Users can choose which to apply.

In this group, if premiums are missing but considered needed (because premium supplements or actuarial claims are reported), these imputations fill the premiums with a value based on the relationship between totals in the stratum of premiums and supplements or (if supplements are also missing) of premiums and actuarial claims. This group includes:

- Impute premiums (SF1_1, SF2_1, SF4_1) from premium supplements (SF1_3, SF2_3, SF4_3).
- Impute premiums (SF1_1, SF2_1) from reported actuarial claims (SF1_2, SF2_2).

d. Group 10: SF. Supplements and actuarial claims from premiums

In this group, if premiums have been reported or estimated, then these imputations fill missing premium supplements and/or actuarial claims with a value in proportion to the premiums. The imputation is based on the relationship between premiums and supplements (if supplements are missing) or between premiums and actuarial claims. This group includes:

- Impute premium supplements (SF1_3, SF2_3, SF4_3) from premiums (SF1_1, SF2_1, SF4_1).
- Impute actuarial claims (SF1_2, SF2_2) from premiums.
- Impute pension benefits (SF4_2) from premiums

e. Group 11: SF. Equate actuarial and paid claims

If one of either realized claims or actuarial claims is considered needed but missing, the missing value is taken directly from the other one. This imputation extends the imputations in G06 and G10 to realized claims as well. This group includes:

- Use paid claims (SF1_2, SF2_2) for actuarial claim (SF1_4, SF2_4).
- Use actuarial claims for paid claims.

f. Group 12: SF. Missing claims adjustment is 0

If the value in SF4_5 *Adjustments to pension benefits* is expected but is missing, it is set to 0. This can be considered a bold imputation similar to imputations in group 21 of harsh cleaning below.

g. Group 13: Impute using stratum median

Imputes a missing value based on the median of non-zero values on the same item in the stratum. Medians for items are adjusted so that when the items are part of a sum, the sum of these adjusted values equals the median of that sum. (If this imputation is active, it takes priority over imputation using stratum mean and renders that imputation obsolete.)

h. Group 14: Impute using stratum mean

Imputes a missing value based on the mean of all values (including explicit and implicit zeros) in the stratum. This is a mutually exclusive option to imputing by stratum median. To activate this imputation, the imputation using stratum median needs to be deactivated.

i. Group 15: Adjust partner country breakdown to match stated total

This group is the first of two groups aimed at matching stated totals for a service type with the corresponding breakdown by country. The two groups are mirror images of each other.

Breakdown by trading partner exceeding the total is shrunk. Missing breakdown or breakdown less than the total is assigned to a code representing a not elsewhere specified partner. This includes the following steps as needed:

- Complete the sum of country breakdown less than the stated total with a value for an unspecified partner.
- Shrink breakdown by partner to the total stated.
- Assign the full sum of the breakdown to an unspecified partner if needed.

j. Group 16: Adjust stated total to match calculated sum of partner country breakdown

Stated totals differing from the sum of the country breakdown are assigned the sum. This includes the following steps as needed:

- Replace exceeding or missing total by the sum of country breakdown.
- Replace incomplete total by sum of country breakdown.

k. Group 17: Adjust stated total for partner country to match calculated sum of modes of supply

Groups 17 and 18 extend the logic in groups 15 and 16 to make the total reported values per partner country match the breakdown by mode of supply.

In group 17, a missing or inconsistent total by partner country is replaced by the sum of the modes of supply breakdown.

l. Group 18: Adjust mode of supply breakdown to match stated partner country total

Complete missing details by mode of supply and country to align with the total

by country. Existing details by mode of supply and country are shrunk or expanded to align with the total by country. This includes the following steps as needed:

- Assign a missing mode of supply a value so the sum of the modes of supply matches the county total.
- Expand modes of supply so the sum corresponds to the total for the country.

m. Group 19: Compute missing total of employees from gender and contract type

Groups 19 and 20 relate to questions A13 *Number of employees during the year* and the associated breakdown by gender and contract type.

In group 19 a missing total of employees is computed from details of gender and contract type.

n. Group 20: Align gender details to total employees

Here the breakdown by gender and contract type is aligned to the totals of full-time and part-time employees.

o. Group 21: Harsh cleaning

This group of imputation is not meant to be used as a primary imputation method. It makes naïve inferences about the existing data to remove error flags. It allows the user to proceed to analysis without error flags in the data but is not recommended as an approach to achieve reliable data. The actions involved are

- Replace any data still flagged as missing by 0. That is, if a value is expected based on other responses but is not available, then this discrepancy is resolved by the naïve interpretation that this value is 0.
- Do the same for elements of SF Insurance and pension services when another element is present.
- Mark values out of bound and outlier data as reviewed and valid.

There are likely to be other imputations that the user wants to perform, perhaps using information about the enterprise that is not entered into TiSSTAT. The user can approach this in two ways. The user can make edits and imputations to reference data and benefit from the logging of changes in TiSSTAT. These edits can be limited to the changes that the survey institution does not want to be treated by the automatic imputations offered. The alternative approach is to edit response data after automatic imputations and re-import final survey response data while keeping reference data and data after automatic imputation stored in TiSSTAT. The first approach is advisable if the user wants to benefit from the aggregation of items on the statistical unit level which is part of the cleaning module. The second approach is available for users who want to perform a more complex operation of including the aggregated items in the imputations.

c. Stratification

In general, any survey aims to minimize two forms of error: *bias* and *variance*. Absence of bias can be termed accuracy, which describes how closely the sample results represent those of the target population. Low variance can be described as precision, reflecting how narrow the confidence interval of the results is. Survey results can sometimes be described as biased yet highly precise (e.g., consistently over- or underestimating trade in service), or as accurate but with a large margin of error (e.g., a wide confidence interval for the values of trade in services). Ideally, survey results are both accurate and precise. Stratification can help achieve higher levels of both accuracy and precision.

Stratification improves precision by reducing variance in trade in services estimates

Stratification reduces variance by dividing the population into homogeneous subgroups, or strata, based on characteristics relevant to the survey variables. Within each stratum, responses tend to be more similar, reducing the variability of responses compared to the overall population. This process results in a smaller sampling error and greater

precision, particularly valuable when some strata are more variable or contain unique patterns. The effectiveness of stratification in reducing variance depends on how well the chosen strata align with variations in the survey variable of interest.

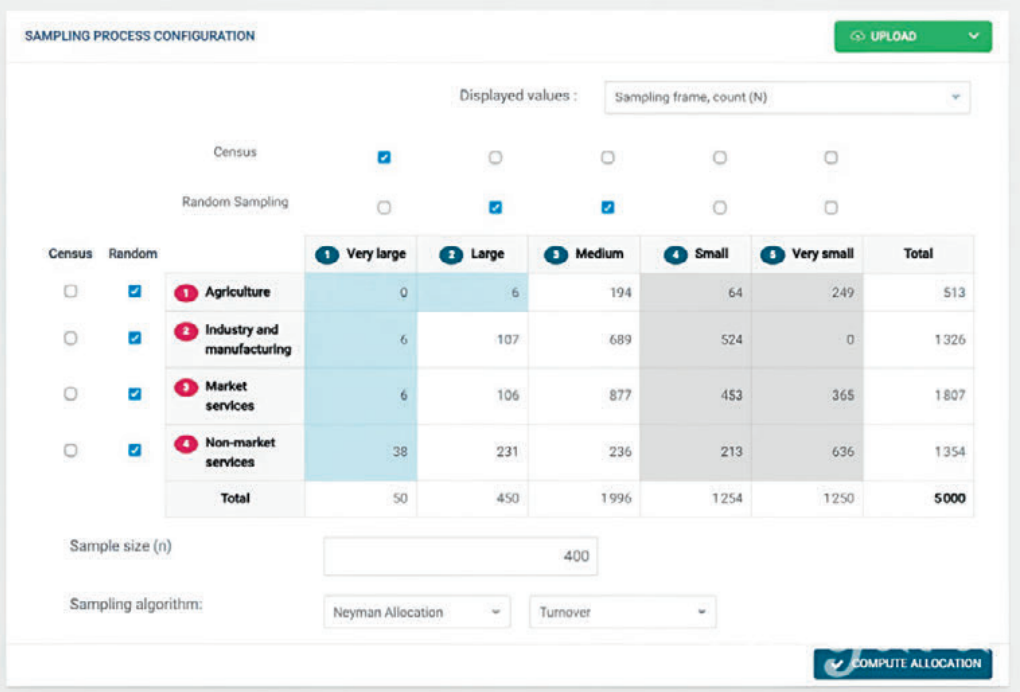
Stratification reduces bias by ensuring that key subgroups of the population are proportionally represented in the sample. Without stratification, certain subgroups might be under- or over-represented, leading to biased estimates that don't accurately reflect the population. Stratifying by characteristics such as size or activity ensures that these groups are fully accounted for, aligning the sample structure more closely with that of the population. This method reduces the risk of systematic errors that can arise when certain groups are missed or inaccurately represented, thereby enhancing the accuracy of the survey results. Stratification also helps mitigate bias due to factors such as differences in response rate between different types of enterprises. For instance, smaller enterprises might have lower response rates than larger ones, leading to bias if these differences aren't accounted for. Stratification ensures that larger enterprises are appropriately weighted, reducing this bias. Effectively, each stratum can be thought of as its own separate survey that gives information about that part of the population. A comprehensive overview of considerations related to stratification is available in UN DESA (2008; see also Thompson, 2012).

TiSSTAT offers stratification according to size and activity. Size strata are determined by setting thresholds for a size indicator. These thresholds can be in relation to one of three variables: *turnover*, *number of employees* or *value added*. Thresholds can be set as an absolute value or as a percentile cutoff on one of those size indicators.

Activity strata group enterprises by their primary economic activity, which is important because industries often differ in their economic behavior, variability and survey responses. When importing a sampling frame into TiSSTAT, it is anticipated to be done with a code for activity. The anticipated code is modelled after the International Standard Industrial Classification (ISIC). Any hierarchical classification system can be used, where the initial digits or letters represent broad categories, and subsequent characters indicate progressively detailed subcategories. TiSSTAT allows the user to, within the chosen classification, choose the level of granularity to use and provides an interface to group codes together. Any customized and unique set of activity code can also be used.

The combination of size and activity stratification creates an activity-by-size matrix of strata. This approach improves both representativeness and precision, as it captures variability across two key dimensions—enterprise size and economic activity. If users do not want to stratify according to either of these two dimensions, they will create matrices with a single row (only size stratification) or a single column (only activity stratification).

Figure VI.1
TiSSTAT offers stratification according to size and activity
Stratification matrix screen



d. Sampling methods

Regardless of the size of the stratification matrix, the user proceeds with specifying, per stratum, what strata to exclude, in what strata to perform random sampling, and in what strata to include all enterprises. Typically, a survey institution favours large enterprises since they have a big impact on the result. A survey institution often performs census sampling among enterprises above a given threshold on a size indicator. Similarly, enterprises below a certain size might not be expected to have significant amounts of international trade in services and excluded in favour of sampling more medium-size or large enterprises (this is the approach represented in figure VI.1).

The stratification is symmetrical in that the same size thresholds are applied for every activity group. A consistent size stratification across activities ensures consistency and comparability across activities and means that users can calculate totals for size strata across all activities. This approach means that the thresholds that can be used for census sampling or exclusion are limited to those thresholds that the user specifies across activities. The user can choose which of these thresholds to apply per activity by making cell-specific selections in the matrix. In figure VI.1 this is done for *large* enterprises in the *agriculture* category. It is possible to divide the inquiry into several additive surveys with different sampling methodologies (see section V.c.1).

The user proceeds by specifying the number of enterprises that will be included in the final sample. The enterprises selected for census are allocated first and the number of these enterprises are subtracted from the total sample. After accounting for census enterprises, the remaining number of enterprises to include in the sample are distributed among the cells chosen for random sampling. Notation in box VI.2 will be useful in the remainder of this chapter.

The number of enterprises drawn from each of the cells with random sampling is calculated using one of three algorithms.

- **Proportional allocation to number of units:** Allocates the sample size n to each stratum based on the proportion of population size N_h in that stratum. This straightforward approach ensures that larger strata receive a proportionally larger number of sampled enterprises. However, it may not account for variability within the variable of interest across strata.
- **Proportional allocation to an auxiliary variable:** Uses the total of an auxiliary size indicator (turnover, number of employees, value added or another auxiliary variable) in each stratum for allocation. This approach works well when the auxiliary variable is correlated with the variable of interest, ensuring economically significant cells are prioritized. It assumes that the auxiliary variable is known for all enterprises in the population.
- **Neyman allocation with an auxiliary variable:** Allocates sample sizes across strata to minimize the overall variance of the estimator for a given total sample size. It achieves this by considering both the total auxiliary variable (τ_{x_h}) and the variability of the auxiliary variable within each cell (S_{x_h}). The allocation ensures that more samples are allocated to strata with higher variability in the auxiliary variable and greater totals of the auxiliary variable. This approach is optimal when the auxiliary variable is highly correlated with the variable of interest. Like the previous algorithm, it assumes that the auxiliary variable is known for all enterprises in the population.

Formulas for allocating samples size to strata are given in box VI.3. The formulas account for the fact that some strata are selected for census sampling or exclusion.

Box VI.2.
Notation used for defining sampling and extrapolation methods

The following notation recur in chapter VI for the definition of sampling and extrapolation methods.

y is the variable of interest. In this context, it is most commonly the value of a particular service traded.

y_i, is the value on y for enterprise i.

x is an auxiliary variable. In this context it is often a size indicator such as turnover, number of employees or turnover.

N is the number of enterprises in the sampling frame.

n' is the number of responding enterprises in the sample (accounting for non-responses and after any adjustments for any moves from one stratum to another).

$\hat{\tau}_h$ is the estimate of a total value for the stratum in the sampling frame.

H is the total number of strata.

$\hat{\tau}_y$ The estimated total value of variable y. The objective of the estimation methods is to find a reliable estimate for this.

Box VI.3.
Algorithms for allocating enterprises to sample per stratum

The formulas in this box use the following definitions:

N_h is the stratum population size,

M' is the adjusted total population size, in those strata where random sampling is performed,

m' is the adjusted sample size, calculated as the total sample size minus the number of enterprises allocated for census sampling,

τ_{x_h} is the total auxiliary variable for stratum h, and

S_{x_h} is the standard deviation of the auxiliary variable for stratum h.

Given these defintions, the number of enterprises to allocate to a stratum in the sample n_h is given by the following formulas.

Proportional allocation to number of units:

$$n_h = \frac{N_h}{M} \cdot m$$

Proportional allocation to an auxiliary variable:

$$n_h = \frac{\tau_{x_h}}{\sum_{h=1}^{H} \tau_{x_h}} \cdot m$$

Neyman allocation with auxiliary variable:

$$n_h = \frac{\tau_{x_h} \cdot S_{x_h}}{\sum_{h=1}^{H} (\tau_{x_h} \cdot S_{x_h})} \cdot m$$

After the allocation of the sample size over strata is determined, the user examines the allocation and, after that, executes the sampling. This generates a sample observing all specifications, and with that sample established, the survey can be launched.

There are alternatives to explicit activity-by-size stratification that offer similar advantages. One example is probability sampling with proportional-to-size selection (PPS), where units are selected with probabilities proportional to a size indicator, creating individual selection probabilities for each enterprise. These individual probabilities are inversely related to the weights used when extrapolating sample data to population estimates. TiSSTAT does not support this more complex method of sampling, but its approach has a similar underlying concept. In stratification, in this case through grouping by size and activity, all enterprises within a stratum are implicitly assigned equal probabilities of selection. These probabilities are determined indirectly by the stratification process and are inversely related to the weights in estimation. The key distinction is that in PPS, probabilities of selection vary for each enterprise based on its size, while in stratification, probabilities are uniform within each stratum (Thompson, 2012).

e. Methods for extrapolation from sample to population

Extrapolation methods ensure accurate population-level trade estimates

TiSSTAT version 1.4.3 includes three algorithms designed to be compatible with the activity-by-size stratification. If the stratification and sampling is done in TiSSTAT, these are readily available. The use of auxiliary variables requires that the auxiliary variable is known for all enterprises in the population. If the stratification and sampling is done outside TiSSTAT, the user can provide sufficient information by importing a file containing, per stratum, number of enterprises and totals for auxiliary variables used, for both sampling frame and sample.

Together with responses from the questionnaire this will allow extrapolation from sample to sampling frame, which in turn represents the population. The three extrapolation methods are:

1. **Expansion estimator,** $\widehat{\tau_{\alpha y}}$: This expands the sample results based on the number of enterprises in the sample in relation to the parallel number of enterprises in the sampling frame.
2. **Combined ratio estimator,** $\widehat{\tau_{\beta y}}$: This uses a single ratio, calculated across the entire sample, to relate the variable of interest to an auxiliary variable. This ratio is then applied to the known total of the auxiliary variable in the population to estimate the total of the variable of interest.
3. **Separate ratio estimator,** $\widehat{\tau_{\gamma y}}$ **:** This calculates a separate ratio within each stratum, relating the variable of interest to an auxiliary variable. Each stratum-specific ratio is applied to the known total of the auxiliary variable within that stratum, and the results are summed to estimate the total of the variable of interest for the entire population.

The three estimators all share the general principle of how to calculate the total over strata.

The total estimate is given by the formula

$$\hat{\tau} = \sum_{h=1}^{H} \widehat{\tau_h}$$

and the variance is given by the formula,

$$Var(\widehat{\tau}) = \sum_{h=1}^{H} Var(\widehat{\tau_h}).$$

The variance is a key result from the survey. The square root of the variance represents the standard error of the results, which can be used to calculate confidence intervals and coefficients of variation. The variance sum law allows variances from individual strata to be summed to represent the variance of the grand total. It is this fact that allows stratification to reduce total variance when variances within strata are low in relation to the variance in the whole sample (Thompson, 2012).

Box VI.4 gives formulas for calculating these three estimators and their associated variances, per strata. The strata level results are then aggregated as the formulas above describe.

Box VI.4.
Formulas for estimator and variance per stratum

The estimate of the total value using the **Expansion Estimator** is given by $\widehat{\tau_{\alpha y_h}} = \frac{N_h}{n'_h}\sum_{i=1}^{n'_h} y_i$

and its variance by $\mathrm{Var}\left(\widehat{\tau_{\alpha y_h}}\right) = N_h(N_h - n'_h)\frac{s_\alpha^2}{n'_h}$,

where

$s_\alpha^2 = \frac{1}{n'_h - 1}\sum_{i=1}^{n'_h}(y_i - \overline{y_h})^2$.

The estimate of the total value using the **Combined Ratio Estimator** is given by $\widehat{\tau_{\beta y_h}} = r_\beta \cdot \tau_{x_h}$

and its variance by $\mathrm{Var}\left(\widehat{\tau_{\beta y}}\right) = N(N - n')\frac{s_\beta^2}{n'}$,

where

$r_\beta = \frac{\widehat{\tau_{\alpha y}}}{\widehat{\tau_{\alpha x}}}$,

$\widehat{\tau_{\alpha x}} = \sum_{h=1}^{H}\frac{N_h}{n'_h}\sum_{i=1}^{n'_h} x_i$,

$\tau_{x_h} = \sum_{i=1}^{N_h} x_i$ and

$$s_\beta^2 = \frac{1}{n' - 1}\sum_{i=1}^{n'}\left(y_i - r_\beta x_i\right)^2$$

The estimate of the total value using the **Stratified Ratio Estimator** is given by $\widehat{\tau_{\gamma y_h}} = r_h \cdot \tau_{x_h}$

and its variance by $\mathrm{Var}\left(\widehat{\tau_{\gamma y_h}}\right) = N_h(N_h - n'_h)\frac{s_\gamma^2}{n_h}$,

where

$r_h = \frac{\sum_{i=1}^{n'_h} y_i}{\sum_{i=1}^{n'_h} x_i}$,

$\tau_{x_h} = \sum_{i=1}^{N_h} x_i$, and

$s_\gamma^2 = \frac{1}{n'_h - 1}\sum_{i=1}^{n'_h}(y_i - r_h x_i)^2$.

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Annex A. Items in part A of the questionnaire

Code	Label[a]	Relation to other items
A1_1	Unit name	
A1_2	Unit postal address	
A1_2_1	Second line of postal address	
A1_3	City	
A1_4	State province or region	
A1_5	Postal code	
A2_1	Respondent name	
A2_2	Respondent function	
A2_3	Respondent telephone	
A2_4	Respondent email	
A3	Contact person name (if different than respondent)	
A3_1	Contact person telephone	
A3_2	Contact person email	
A4	Is this unit the main enterprise?	
A4_1	If this unit not the main one, main unit name	
A4_21 – A4_26	If this unit not the main one, main unit address	
A4_3	Relationship of this unit to the main unit	
A5	Does this unit have branches or subsidiaries in the country?	
A5_x_1	If there are branches or subsidiaries, name of branch or subsidiary	
A5_x_2	Is the branch or subsidiary included in the reporting?	
A6	Activity start date	
A7	Total percentage of turnover accounted for in A7_A – A7_S	Sum of items A7_A – A7_S
A7_1	Main activity	Biggest value among A7_A – A7_S
A7_A – A7_S	Percentage of turnover per activity in the the International Standard Industrial Classification of All Economic Activities (ISIC)	
A8	Does the unit have non-resident investors?	
A8_x_1	If the unit has non-resident investors, investor country (repeated in case of multiple investors)	
A8_x_2	Percentage of investment of non-resident investor	
A9	Does the unit use the internet for service transactions?	
A10	Was the unit in operation during the surveyed year?	
A11	Does your declaration cover the 12 months of the year of survey?	

Code	Label[a]	Relation to other items
A11_1	If not, number of months reported	
A12	Turnover during the surveyed year	
A13	Total employees	A13_01 + A13_02
A13_01	Female employees	A13_31 + A13_41
A13_02	Male employees	A13_32 + A13_42
A13_1	Full-time employees	
A13_2	Part-time employees	
A13_3	Permanent employees	A13_31 + A13_32
A13_31	Female permanent employees	
A13_32	Male permanent employees	
A13_4	Temporary employees	A13_41 + A13_42
A13_41	Female temporary employees	
A13_42	Male temporary employees	
A14	Did the enterprise have any service transactions with non-residents during the surveyed year?	
A14_SA – A14_SL	Did the enterprise have any service transactions with non-residents, specified per main service category.	
A15_1	Reported time needed to complete the survey	
A15_2	Comments on the survey from the respondent	

[a] Labels describe the content of the item. The wording of the questions differ from the label.

Annex B. Items in parts B and C of the questionnaire

Key:

- Code: Code before underscore (_) refer to a SDMX code for EBOPS items.
- Input: ☐ asked from the respondent, > must be imported, ☐/> asked from respondent or imported depending on if the unit is an insurance company or not. All other items are calculated as described in the column "Relationship to other items"
- Label: Describes the content of the item. When asked, the wording of the question differs.
- Possible or implicit modes of supply: 1 = Cross-border supply, 2 = Consumption abroad, 3 = Commercial presence, 4 = Presence of natural persons.

Code	Input	Label	Relation to other items	Possible or implicit modes of supply
SA	☐	Manufacturing services on physical inputs owned by others		
SAY_1	☐	Goods for processing in reporting economy - Goods received		
SAY_2	☐	Goods for processing in reporting economy - Goods returned		
SAZ_1	☐	Goods for processing abroad - Goods sent		
SAZ_2	☐	Goods for precession abroad - Goods returned		
SB	☐	Maintenance and repair of goods		
SC		Transport	SC1 + SC2 + SC3 + SC4	
SC1		Sea transport	SC11 + SC12 + SC13	
SC11		Sea transport; Passenger	SC11_1 + SC11_2	
SC11_1	☐	Maritime passenger transport		
SC11_2	☐	Rental of vessels with crew for passenger transport		
SC12		Sea transport; Freight	SC12_1 + SC12_2	
SC12_1	☐	Maritime freight transport		
SC12_2	☐	Rental of vessels with crew for freight transport		
SC13	☐	Sea transport; Other than passenger and freight		
SC2		Air transport	SC21 + SC22 + SC23	
SC21		Air transport; Passenger	SC21_1 + SC21_2	

Code	Input	Label	Relation to other items	Possible or implicit modes of supply
SC21_1	☐	Air passenger transport		
SC21_2	☐	Rental of aircraft with crew for passenger transport		
SC22		Air transport; Freight	SC22_1 + SC22_2	
SC22_1	☐	Air freight transport		
SC22_2	☐	Rental of aircrafts with crew for freight transport		
SC23	☐	Air transport; Other than passenger and freight		
SC3		Other modes of transport (other than sea and air)	SC3A + SC3B + SC3C + SC3D + SC3E + SC3F + SC3G	
SC3A	>	Space transport		
SC3B		Rail transport	SC3B1 + SC3B2 + SC3B3	
SC3B1		Rail transport; Passenger	SC3B1_1 + SC3B1_2	
SC3B1_1	☐	Rail passenger transport		
SC3B1_2	☐	Rental of trains with driver for passenger transport		
SC3B2		Rail transport; Freight	SC3B2_1 + SC3B2_2	
SC3B2_1	☐	Rail freight transport		
SC3B2_2	☐	Rental of trains with driver for freight transport		
SC3B3	☐	Other rail transports		
SC3C		Road transport	SC3C1 + SC3C2 + SC3C3	
SC3C1		Road transport; Passenger	SC3C1_1 + SC3C1_2	
SC3C1_1	☐	Road passenger transport		
SC3C1_2	☐	Bus and coach rental with driver		
SC3C2		Road transport; Freight	SC3C2_1 + SC3C2_2	
SC3C2_1	☐	Road freight transport		
SC3C2_2	☐	Truck rental with driver		
SC3C3	☐	Other road transports		
SC3D		Internal waterway transport	SC3D1 + SC3D2 + SC3D3	
SC3D1		Passenger transport, Internal waterway	SC3D1_1 + SC3D1_2	
SC3D1_1	☐	Inland waterway transport; Passengers		
SC3D1_2	☐	Rental of vessels with crew for internal waterways passenger transport		

Code	Input	Label	Relation to other items	Possible or implicit modes of supply
SC3D2		Inland waterway transport; Freight	SC3D2_1 + SC3D2_2	
SC3D2_1	□	Internal waterways freight transport		
SC3D2_2	□	Rental of vessels with crew for internal waterways freight transport		
SC3D3	□	Inland waterway transport; Other than passenger and freight		
SC3E	□	Pipeline transports		
SC3F	□	Electricity transmission		
SC3G		Other supporting and auxiliary transport services	SC3G_1 + SC3G_2 + SC3G_3	
SC3G_1	□	Multimodal passenger transports		
SC3G_2	□	Multimodal freight transports		
SC3G_3	□	Other multimodal transports		
SC4		Postal and courier services	SC4_1 + SC4_2 + SC4_3	
SC4_1	□	Postal services		
SC4_2	□	Courier services		
SC4_3	□	Commissions received/paid from/to non-resident postal/courier services		
SD	>	Travel		
SE		Construction	SE1 + SE2	
SE1		Construction abroad	SE1_1a + SE1_2a	
SE1_1a	□	Construction of bridges, dams, roads abroad <= 12 months		4
SE1_1b	□	Construction of bridges, dams, roads abroad > 12 months		3
SE1_2a	□	Other constructions abroad <= 12 months		4
SE1_2b	□	Other constructions abroad > 12 months		3
SE2		Construction in the reporting economy	SE2_1a + SE2_2a	
SE2_1a	□	Construction of bridges, dams, roads in reporting country <= 12 months		2
SE2_1b	□	Construction of bridges, dams, roads in reporting country > 12 months		3
SE2_2a	□	Other constructions in reporting country <= 12 months		2
SE2_2b	□	Other constructions in reporting country > 12 months		3
SF		Insurance and pension services	SF1 + SF2 + SF3 + SF4	
SF_IC	□	Is the business an insurance company or a pension fund? (Yes/No)		

Code	Input	Label	Relation to other items	Possible or implicit modes of supply
SF1		Direct insurance	SF1_1 + SF1_3 - SF1_4	
SF1_1	□	Premiums paid for direct insurance		
SF1_2	□	Claims paid out for direct insurance		
SF1_3	□/>	Premium supplements for direct insurance		
SF1_4	□/>	Actuarial claims expected for direct insurance		
SF2		Reinsurance	SF2_1 + SF2_3 - SF2_4	
SF2_1	□	Premiums paid for reinsurance		
SF2_2	□	Claims paid out for reinsurance		
SF2_3	□/>	Premium supplements for reinsurance		
SF2_4	□/>	Actuarial claims expected for reinsurance		
SF3		Auxiliary insurance services	SF3_1	
SF3_1	□	Commissions, brokerage and advisory fees etc.		
SF4		Pension and standarised guarantee services	SF4_1 + SF4_3 - SF4_4	
SF4_1	□	Contributions to pension and standardized guarantee services		
SF4_2	□	Benefits paid out		
SF4_3	□/>	Supplements for contributions pension and standardized guarantee services		
SF4_4		Adjusted pension and standardized guarantee services benefits	SF4_2 + SF4_5	
SF4_5	□/>	Adjustments to pension entitlements.		
SG		Financial services	SG1 + SG2	
SG1	□	Financial services explicitly charged and other financial services		
SG2	>	Financial intermediation services indirectly measured (FISIM)		
SH		Charges for the use of intellectual property (n.i.e.)	SH1 + SH2 + SH3 + SH4	
SH1	□	Franchises and trademarks licensing fees		
SH2		Licences for the use of outcomes of research and development	SH2_1 + SH2_2	
SH2_1	□	Patents, processes or trade secrets fees outcome from R&D		
SH2_2	□	Reproduction or distribution rights fees for goods outcome from R&D		
SH3	□	Licences to reproduce and/or distribute computer software		
SH4		Licences to reproduce and/or distribute audio-visual and related products	SH41 + SH42	

Code	Input	Label	Relation to other items	Possible or implicit modes of supply
SH41	☐	Licences to reproduce and/or distribute audio-visual products		
SH42		Licences to reproduce and/or distribute other than audio-visual products	SH42_1 + SH42_2	
SH42_1	☐	Distribution fees for live shows and broadcast		
SH42_2	☐	Distribution fees for original manuscripts, paintings, sculptures etc.		
SI		Telecommunications, computer and information services	SI1 + SI2 + SI3	
SI1		Telecommunications services	SI1_1 + SI1_2	
SI1_1	☐	Charges for transmission of sound, images or information		
SI1_2	☐	Charges for international calls by landlines or mobile phones		
SI2		Computer services	SI21 + SI22	
SI21		Computer software	SI21_1 + SI21_2 + SI21_3 + SI21_4	
SI21_1	☐	Software design, production, installation and maintenance of custom software and related rights.		1, 4
SI21_2	☐	Non-customized / mass produced, downloaded or electronically delivered software		
SI21_3	☐	Periodic license fees for the use of non-customized / mass produced software		
SI21_4	☐	Transactions of original software systems and applications and related property rights		
SI22		Computer services other than computer software	SI22_1 + SI22_2	
SI22_1		Installation, maintenance and management of hardware and software		1, 4
SI22_2		Data recovery, data processing and web page hosting		1, 4
SI3		Information services	SI31 + SI32	
SI31	☐	News agency services		
SI32		Information services other than news agency services	SI32_1 + SI32_2 + SI32_3	
SI32_1	☐	Library and archive services		
SI32_2	☐	Database services		
SI32_3	☐	Paid downloads		
SJ		Other business services	SJ1 + SJ2 + SJ3	
SJ1	☐	Research and development services		1, 4
SJ2		Professional and management consulting services	SJ21 + SJ22	

Code	Input	Label	Relation to other items	Possible or implicit modes of supply
SJ21		Legal, accounting, management consulting, and public relations services	SJ211 + SJ212 + SJ213	
SJ211	☐	Legal services		1, 4
SJ212	☐	Accounting, auditing, bookkeeping, and tax consulting services		1, 4
SJ213	☐	Business and management consulting and public relations services		1, 4
SJ22	☐	Advertising, market research, and public opinion polling services		1, 4
SJ3		Technical, trade-related and other business services	SJ31 + SJ32 + SJ33 + SJ34 + SJ35	
SJ31	☐	Architectural, engineering, scientific, and other technical services		1, 4
SJ32		Waste treatment and de-pollution, agricultural and mining services	SJ32_1 + SJ323	
SJ32_1	☐	Waste treatment and de-pollution and services incidental to agriculture, forestry and fishing		1, 4
SJ323	☐	Services incidental to mining, and oil and gas extraction		1, 4
SJ33	☐	Operating leasing services		1, 4
SJ34	☐	Trade-related services		1, 4
SJ35	☐	Other business services n.i.e.		1, 4
SK		Personal, cultural and recreational services	SK1 + SK2	
SK1	☐	Audiovisual and related services		1, 4
SK2		Other personal, cultural, and recreational services	SK21 + SK22 + SK23 + SK24	
SK21	☐	Health services		1, 4
SK22	☐	Education services		1, 4
SK23	☐	Heritage and recreational services		1, 4
SK24	☐	Other personal services		1, 4
SL		Government goods and services n.i.e.	SL_1 + SL_2 + SL_3	
SL_1	☐	Goods and services provided to foreign enclaces present in the country		1, 4
SL_2	☐	Granting of visas and various permits		2, 4
SL_3	☐	Goods and services purchased abroad by government entities of reporting country		1, 4

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