Procurement AntiCorruption and Transparency Platform (ProACT): Technical Report

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I. Introduction

The vital role of public procurement in supporting development outcomes is now increasingly well understood. What is less well understood is how and where corruption risks are adding to public costs and undermining procurement outcomes. The Procurement AntiCorruption and Transparency platform (ProACT)[1] is harnessing data analytics to provide easy access to public procurement data to a wide range of users and promote transparency and integrity in public expenditures on goods, works and services. The foundation of any kind of analytics in public procurement is data and the methodologies underpinning indicator calculations. Hence, it is crucially important for users to fully understand the data sources used, the data processing and indicator calculations, how to interpret and use results, and the limitations of the methodology.

This document describes the main processes for building the public procurement datasets, indicators and analyses shown in the ProACT platform. At the time this technical report was prepared, the ProACT platform builds on the public procurement data collected and harmonized by the Government Transparency Institute (GTI) and made publicly available. Using these open datasets as inputs, the ProACT platform constructs integrity risk indicators, transparency indicators, competition indicators, and uses them for analyses and data investigations. The intended audience for this document is data analysts, public procurement policy professionals and researchers interested in harmonizing public procurement datasets collected from various sources and restructuring them in publishable formats.

The document is organized as follows. Section II describes how GTI scrapes the data from international organizations' and countries' open data portals, the publication matching processes performed on the collected data to reach a final record that reflects the full tendering cycle as completely as possible, and the main steps to prepare the data for transparency, competition and corruption risk analysis. Section III provides a definition of all the performance indicators used in ProACT – corruption risk indicators, transparency indicators, and competition indicators – and the red-flag methodology for identifying contracts, buyers or suppliers with high integrity risk. Section IV discusses the main limitation of the data from the public procurement open portals used in ProACT. Finally, Annex 1 provides the lists of data sources used for ProACT at the time this technical report was prepared, and Annex 2 presents the exact definitions for the integrity risk indicators for each country, as derived from the red-flag methodology.

The data processes outlined below are fully documented and can be replicated using the following Github repositories below. In each section, we will mention the exact repository where the processes can be replicated.

- GTI - Digiwhist Data Collection System (DDCS): This repository is responsible for replicating the data scraping from the public procurement open data portals and mastering[2] the collected

[1] https://www.procurementintegrity.org/

[2] We use the term "mastering" to refer to the process of matching different publications to each other using each document's identification number to arrive at one observation that best describes the tendering cycle. More information in Section II A.

data. The output of the repository are country datasets where each record accurately represents a contract's tendering cycle. This corresponds to Section II.A.

- ProACT: This repository uses the outputs from the previous repository as inputs and performs further cleaning steps (Section II.B), calculates performance indicators (Section III), and structures the datasets to be shown on the ProACT platform.

II. Data

This section discusses the implemented processes to prepare the datasets for the ProACT platform. Subsection A provides an overview of the different ways for collecting the data from public procurement open data portals and of the data mastering processes. Subsection B elaborates on the methods used to supplement and harmonize the country datasets.

A. Data collection and mastering[3]

An automated web crawler is developed to scrape data from each public procurement open portal used for this project. A full list of sources can be found in Annex 1, Table A.1.1. The data processing consists of the following steps. First, primarily HTML, XML, JSON and CSV files are downloaded or scraped from official government sources.[4] Data can be collected only from countries and international organizations that publish structured data on their public procurement procedures (i.e. structured tender notices or databases).[5] Second, each publication is transposed from its original format to a uniform structured data template, including converting structured text to standard data types (numbers, dates, enumeration values), and cleaning the database from erroneous information.[6]

The procurement cycle is typically divided in the following stages: (i) budget planning and tender preparation; (ii) tender process, bidding process, and bid evaluation; (iii) contract award and contract signing; and (iv) contract execution and monitoring. This data can be organized at the tender, lot, item (product), bid, and contract level, and typically data from different stages is stored in different files. Therefore, the next step is to link all the information that describes the same procurement process, from the Call for Tenders (one or more) to the Contract Award (one or more), and completed by a series of payments (or contract completion announcement). We also

[3] The processes outlined in this section can be replicated using this repository: https://github.com/digiwhist/master

[4] Various programming languages are used in this step (such as Python, Java etc.) depending on the source data.

[5] In a few countries, such as Paraguay, the official procurement publications are also available in OCDS format, hence we use them as a starting point for creating the structured source datasets that are standardized across all countries.

[6] Erroneous information may come from data entry errors from the scraped source or badly scraped fields (for example having organization names where dates are to be expected). This cleaning step can go back and forth between scraping and validating the datasets until a satisfactory version is reached.

take into account if any modifications or cancellations occur to the tender and/or contract at any point during the process. After successfully linking all published data referring to the same procurement process, the available information is reconciled to create a single best image covering the whole procurement cycle, including reconciling conflicting information or filling in empty fields if available in a related notice. The single best image of a tender is organized at the contract level.[7] A sample of the data is cross-checked manually with the publications' sources to verify that this process captures complete and accurate information. This stage may imply several rounds of data validation to ensure that all the annotated data fields are correctly captured.

This stage can be summarized by two sub-processes. First, a data collection stage where the data sources are scraped, linked together and transformed to a structured dataset that can be easily analyzed. Second, a data validation stage, which is composed of several rounds of manually cross-checking the scraped data with the source and ensuring that all fields are correctly scraped. Often, the datasets go back and forth between these two stages until it is verified that the scraped data set accurately reflects the information in the data source.

At the time this technical report was prepared, these steps were already completed by GTI, and the resulting datasets were made publicly available and then used as inputs for the ProACT platform. From this point forward, in this report we will refer to these datasets as the "structured source datasets". The datasets maintained by GTI are collected from official procurement sources (such as procurement notices, or structured data publications upon availability) and contain the most relevant tender information such as product codes, procedure types, dates, buyer and supplier details, prices, and, for countries for which more granular data is publicly available, item-level information (unit price, quantity etc.). Overall, this process involves processing a wide range of sources from html publications to APIs, making sense and cleaning of unstructured data fields.

B. Data processing[8]

Once the structured source datasets are compiled, several data cleaning procedures are performed to prepare the data for analysis. The cleaning steps include variable transformations (such as dates), data enhancements (such as location variables), and country-specific fixes (such as product code transformations). This section documents the main transformations and enhancements that are performed on the structured source datasets.[9]

[7] If the procurement data portal publishes information on the losing bidders as well, the data is organized at the bid level. A dedicated variable indicates the winning bidder(s) for each lot within a tender.
[8] The processes outlined in this section can be replicated using this repository https://github.com/INTVP/proACT/
[9] Overall, the approach to data transformations and enhancements is conservative, meaning that original data are shown whenever possible. The data transformations and enhancements that are implemented are only those that are necessary for showing complete visualizations on the platform. For example, it is necessary to clean procuring entity names in order to identify all contracts from the same buyer and show indicators by buyer.

General filter: The main source datasets are filtered in order to retain only records that refer to contracts that are actually awarded. Contracts without the supplier name or that are canceled are removed.

Tender year: Missing values of the tender year are filled using the contract award publication year, contract award year, or call for tender publication year.

Procurement entities and firms names: Contracts with badly scraped organization names which are composed by only non utf-8 symbols and/or only punctuation marks are removed, as these names are just erroneous data. We also perform basic cleaning steps such as removing any odd characters, back slashes, and extra whitespaces.

Price and PPP adjustments: Using the currency variable, we create the PPP adjusted price data to allow for cross country comparisons. We use the PPP conversion factor, GDP (LCU per international $) indicator (code: PA.NUS.PPP) available from the World Bank open data portal.[10]

Product Codes: There are generally 4 types of improvements based on each case, as summarized in Table 1:

- Contracts that report a CPV classification older than CPV-2008 are changed to missing.
- If the product classification is missing, we use codes for missing products based on the supply type:
    - 99100000 for uncategorized supplies
    - 99200000 uncategorized services
    - 99300000 uncategorized works
    - 99000000 if the supply type is missing.
- Countries use different product classification systems. Since the majority of our datasets use the CPV-2008 (Common Procurement Vocabulary) system, we decided to use it as the reference product classification system. Thus, all other systems are converted to the CPV-2008.[11]
    - UNSPSC in Paraguay, Colombia and Chile
    - PSC in the United States
    - CUCOP in Mexico
    - A national product classification system in Uruguay
- For countries with completely missing product codes, we use the item/lot description variables to match to CPV-2008 codes.[12]
    - After cleaning the item/lot description variable by removing punctuation marks and other symbols, numbers, and measuring units, we perform a token-based matching algorithm[13] to match item/lot descriptions to CPV codes. The possible

[10] https://data.worldbank.org/

[11] Correspondence tables can be found in the preparatory codes (cpv_correspondance do files) where this correspondence is applied (https://github.com/INTVP/proACT/tree/code-uploads/country_codes). See Table 1 for a list of countries where product codes are transformed to CPV product codes.

[12] This is the case, for example, for data downloaded from the World Bank or from the IADB.

[13] Stata's matchit (Available from SSC) – the algorithm splits the contract title to tokens/words and matches them to the CPV descriptions. A score is then given reflecting the degree of similarity between the title and the CPV description. We then agree on a suitable cut-off score as we manually validate the possible matches. The matching algorithm and the chosen cut-off similarity scores are documented in the countries where we perform this procedure in https://github.com/INTVP/proACT/ (See Table 1).

matches are then manually evaluated to choose a suitable similarity score[14] to be used as a cut-off value for a conservative matching process.

- We also perform keyword-based matching to supplement the token-based matching algorithm.[15]

Procurement Entity Location: We perform several operations to improve on the geolocation data in our datasets:

- Location standardization. This is a standard operation to ensure that location names are consistent within each dataset. Currently, this is a manual operation where the analyst manually consolidates different ways of referring to the same location (ex: Bucharest, București, Bukarest). Differences might arise from referring to the location by different languages or data entry errors. A token-based matching is also used to group similar strings, therefore addressing data entry errors in location strings. This location standardization process is performed for all countries and data sources,
- Geolocation API. A geolocation API service is used to standardize the locations for those data sources (See Table 1) where the geolocation information is of particularly bad quality, for example in cases where different administrative levels of a location are given (for example districts instead of cities).
- Manual Matching. If no geolocation data is available, such as in the case of the public procurement data from the Paraguay procurement portal, keywords are used to search for major cities in the tender/lot title and description to assign a city for the procurement authority's geolocation. This strategy works particularly well in countries where most of the public procurement spending is condensed in major cities.

Table 1: Country specific data enhancements

Enhancement	Procedure	Countries
Product Code	Transformed to CPV2008	CL, CO, UY, MX, PY, US
	Token-based matching	WB, IDB, ID, UG, IN, MX
	Keyword-based matching	MX, IN, ID, UG
Procurement Entity Geolocation	Manual matching	PY
	Geolocation API	MX, GE, ID, IDB

[14] The matching algorithm used is more efficient as the sample space is smaller. Therefore, two rounds of matching are performed, the second one after excluding successful matches from the 1st round. This method was used for UG, IN and MX. The cut-off scores are: for UG, 0.61 and 0.55 for the 1st and 2nd attempt; for IN, 0.3 for both attempts; for MX, 0.4 for both attempts. For ID, IDB and WB, only one round of matching was performed, since no good matches were found in the 2nd round. The cut-off similarity score for the IDB data is 0.3. For ID and WB, the cut-off score is 1, meaning that only perfect matches are kept.

[15] The keywords were collected over the course of several projects to accurately reflect and distinguish between several product groups.

A. Sanctions[16]

In addition to procurement data, ProACT also shows some indicators derived from connecting procurement and debarment data. The data process for integrating sanctions data in the ProACT platform is still under piloting, and therefore this section describes the current status of the pilot, and will be subject to revisions in the next versions of the platform.

Currently, the sanctions datasets are obtained from the World Bank Administrative Remedies against Corruption (ARC) project. The objective of this project was to assess the feasibility of building an information sharing platform. This platform intended to provide access to aggregated information on administrative remedies imposed on firms by national or international authorities for corrupt behavior. As a pilot, the ARC project collected debarment data from 32 data sources. Given the exploratory nature of the ARC project, this data has not been made publicly available, but it was provided to the ProACT team for piloting the feasibility of building integrity indicators by connecting public procurement and debarment data. Annex 1, Table A.1.2 lists the data sources for the sanctions data used in the version of ProACT, as of the time this technical report was prepared.

In order to use the sanctions data for the construction of indicators, it is necessary to identify the suppliers listed in both the public procurement data and in the sanctions data. To do so, supplier names coming from both the sanction data and the public procurement data are cleaned and prepared for matching. Namely, any country name, backslash, extra whitespace, hyperlink, or odd character (ie: . „ “ , ‘ » « › ‹) are removed from the supplier names, and the legal forms are standardized.[17]

Once both supplier names are cleaned following the same procedure, cleaned supplier names from the procurement data and cleaned supplier names from the sanctions data are matched. The output of this process is a CSV file where each row is a sanction occurrence which can then be easily linked with the procurement data. The main information extracted from the sanctions data is: supplier name, sanction start date, sanction end date, name of sanctioning authority, and legal ground for sanctioning.

The current version of ProACT demonstrates the feasibility of building integrity indicators from connecting public procurement and debarment data. In the next versions of ProACT, a complete algorithm for downloading debarment data from international open sources will be developed and implemented at scale.

[16] The processes outlined in this section can be reviewed using this repository https://github.com/INTVP/proACT/tree/code-uploads/debarment

[17] We collected all possible legal forms on companies in most countries we work with from various sources online and from within our datasets. A detailed explanation of the legal form standardization can be found in the dedicated github repository https://github.com/INTVP/proACT/tree/code-uploads/debarment

III. Performance indicators

A. Integrity risk indicators

The integrity risk indicators capture strategies for corruption that are specific to public procurement and detectable with open public procurement data. These strategies are associated with deviations or non-compliance with rules governing public procurement processes, or the manipulation of outcomes (denoting possible complicity between buyers and suppliers, or among suppliers). These strategies represent deviations from principles of openness that enable fair competition in public procurement, thus benefiting some to the detriment of others. A simple way to measure the presence of these types of corrupt behaviors is to consider the prevalence of single bidding (one bid submitted in a tender) in procedures intended to be competitive. Similarly, we look at the creation of non-competitive tendering conditions for bidders (for example, the selection of non-open procedure types or the shortening of advertising periods). The indicators most likely to signal violations to integrity were identified through statistical analysis based on a significant and positive relationship with single bidding and share of a supplier's contracts dependent on one procurement organization. For an explanation of the underlying conceptual framework, see (Fazekas, Tóth, and King 2016).[18] While extensive testing (see below) shows that the indicators are statistically significantly associated with lower levels of competition, they only show risks and do not per se signal wrongdoing or deliberate unethical behavior. They help to understand risky trends in tendering practices, and to point out tenders or markets where further analysis is warranted.

An advantage of using such integrity indicators is that they stem directly from micro data on public procurement contracts, regardless of changes in the local procurement rules. Understanding the specific regulatory changes offers valuable insights on how the public procurement environment is organized. However, the integrity risk indicators behave as corruption proxies through tracking the typologies of corruption and help policymakers pinpoint specific practices that are being exploited to undermine the integrity of the public procurement process.

In practice, this method allows us to identify the procedure types, lengths of submission/decision periods etc. which are most associated with integrity risks. The specific indicator thresholds are defined by performing country specific OLS regressions with controls for the tender year, product market, contract types (services, goods, works), procurement entity types (national and regional entities), and procurement entity locations. Several specifications are estimated to maximize the model's fit and reach a statistically significant conclusion on each indicator's definition. The full list of indicators is outlined along with conceptual definitions in Table 2. The exact, technical definitions can be found in Annex 2 for each country. As the datasets and procurement legislations are updated, these definitions should also be regularly reevaluated to ensure that the indicator definitions still maximize the model's fit and are in line with changes in legislation.

[18] Fazekas, Mihály, István János Tóth, and Lawrence Peter King. 2016. 'An Objective Corruption Risk Index Using Public Procurement Data'. *European Journal on Criminal Policy and Research* 22 (3): 369–97.

Table 2: List of Integrity risk indicators

Risk Indicator	Integrity Risk	Values	Category of indicator	Level of calculation	Data source
Use of non-open procedure types	Using procedure types which are less transparent and require less open competition can indicate the deliberate limitation of the range of bids received and exclude bids as well as create more opportunities for contracting bodies to repeatedly award contracts to the same well-connected company.	100: open; procedure type is not considered a red flag for the country 50: limited; procedure type is considered a mild red flag for the country 0: non-open; procedure type is considered a red flag for the country	Procurement process risk	Contract	e-procurement
Call for tenders publication	Not publishing the call for tenders makes it less likely that eligible bidders notice the bidding opportunity, weakening the competition and allowing the contracting bodies to more easily award contracts to a well-connected company repeatedly.	100: call for tender/prior information notice is published 0: no call for tender/prior information notice is published	Procurement process risk	Contract	e-procurement

Length of advertisement period (time between tender advertisement and the submission deadline)	A short submission period, that is the number of days between publishing a tender and the submission deadline, leaves less time and thus makes it harder for non-connected companies to bid successfully, whereas a well-connected firm can use its inside knowledge to win repeatedly as the buyer can informally inform the favored bidder about the opportunity ahead of time.	100: number of days between publication of call for tenders and submission deadline is in an interval not considered a red flag for the country 50: number of days between publication of call for tenders and submission deadline is in an interval considered a mild red flag for the country 0: number of days between publication of call for tenders and submission deadline is in an interval considered a red flag for the country	Procurement process risk	Contract	e-procurement
Single bidder contract	Single bidding is the simplest indication of restricted competition reflecting potential integrity risk when only one bid is submitted for a tender in a competitive market (for further discussion of single bidding see Charron, Dahlström, Fazekas, & Lapuente, 2017).	100: more than 1 bid received 0: 1 bid received	Procurement process risk	Contract	e-procurement

Length of decision period (time between submission deadline and contract award decision date)	An excessively short or long decision period, that is the number of days between the submission deadline and the contract award decision, can signal integrity risks. Snap decisions may reflect premeditated assessments, while long decision periods may signal extensive legal challenges for the tender, suggesting that the issuer attempted to limit competition.	100: number of days between publication of call for tenders and submission deadline is in an interval not considered a red flag for the country 50: number of days between publication of call for tenders and submission deadline is in an interval considered a mild red flag for the country 0: number of days between publication of call for tenders and submission deadline is in an interval considered a red flag for the country	Procurement process risk	Contract	e-procurement
Benford's law	Benford's law is an observation about the leading digits of a naturally occurring collection of numbers. It states that the first digit is likely to be small, for example, in sets that obey the law, the number 1 appears as the leading digit about 30% of the time, while 9 appears as the leading digit less than 5% of the time. If this indicator has high value, it indicates that the price of the contract obeys Benford's law, thus it's similar to naturally occurring collection of numbers, and it's less likely that the price is manipulated. In the ProACT platform, we apply the Benford law to every buyer with more than 100 contracts.	100: contract price is less likely manipulated 0: contract price is most likely manipulated	Procurement process risk	Buyer	e-procurement

Supplier's contract share of buyer spending on public procurement	Suppliers' share in a buyer's total spending in a given year can be used as a measure of market competitiveness and openness. A high share of supplier spending can signal that a supplier or a group of suppliers are part of a network, potentially leading to higher prices, and/or lower quality and value for money.	100: the winner's share is close to 0% 0: the winner's share is 100% Continuous number between 0 and 100	Supplier risk	Supplier	e-procurement
Supplier is registered in a tax haven	Awarding public contracts to companies registered in tax havens presents a risk that anonymous company ownership could conceal a conflict of interest in the award of a contract to a politically connected beneficial owner. The potential loss of tax revenue from the successful supplier through permissible tax avoidance or illicit tax avoidance is another risk. While the definition of 'tax haven' (or secrecy jurisdiction) is still a matter of debate, this indicator uses an independent ranking by the Tax Justice Network of countries' legal frameworks with regards to banking and corporate secrecy.	100: supplier is not registered in tax haven country 0: supplier is registered in tax haven country	Supplier risk	Supplier	e-procurement Financial Secrecy Index
Delivery delay (relative contract length increase)	Delayed contract delivery (eventual project length measured in days compared to the expected project duration at contract award) can negatively impact value for money and the quality of goods and services provided, or even incomplete procurements resulting in social costs.	100: relative delivery delay is unrelated to integrity risks 0: relative delivery delay is related to integrity risks	Procurement process risk	Contract	e-procurement

Cost overrun	There might be justifiable reasons for the additional purchase of goods and services that were not part of the original contract. However, contract modifications after contract award can be used to extract unwarranted profits, cover the costs of bribes spent to secure a contract award, or cover expenses if the favored company could only win the contract by offering the lowest price.	100: relative contract price increase (difference between contract value and estimated bid price as a ratio of estimated bid price) is in an interval not considered a red flag for the country 0: relative contract price increase is in an interval considered a red flag for the country	Procurement process risk	Contract	e-procurement

B. Transparency Indicators

Transparency indicators capture the completeness of the procurement data publicly available on open portals. Information can be missing because of the design of the eGP system or open portal itself, or they can vary across contracts within the same country due to intentional omissions or data errors. Table 3 presents the fields on which the ProACT transparency indicators are computed.

Table 3: List of Transparency Indicators

Indicator name	**Formula**
Available buyer name	0: information missing, 100: information available
Available contract title	0: information missing, 100: information available
Available supplier name	0: information missing, 100: information available
Available supply type	0: information missing, 100: information available
Available contract value	0: information missing, 100: information available
Available buyer/implementation location	0: information missing, 100: information available
Available procedure type	0: information missing, 100: information available
Available number of bids	0: information missing, 100: information available
Available award date	0: information missing, 100: information available

C. Competition Indicators

The academic literature has demonstrated the links between lack of competition and inefficiencies in the public procurement system, resulting in lower quality products and/or higher costs of government purchases. The ProACT platform intends to increasingly cover dimensions related to efficiency and value for money, and the first step is the development of competition indications that can be applicable across countries.

The ProACT platform provides several indicators that measure competition. For example, the number of bidders is a direct indicator for the level of competition for the tender/lot. The supplier market entry indicator flags suppliers if they are new entrants in the market[19]. Supplier market share is a continuous indicator that calculates the share of the market the supplier received in a given year. The non-local supplier indicator flags contracts where the firm is from a different city than the procuring entity. Table 4 lists the competition indicators and their definitions.

[19] Markets are defined using the first 2-digits of the CPV code.

Table 4: List of Competition Indicators

Indicator name	Values
Non-local supplier	0: Supplier is local, 100: Supplier is non-local, NA: No information
Number of bidders	Counts the number of bidders in the lot
Supplier market entry	0: Supplier existed in the market in the past 2 years 100: Supplier is a new entrant in the market NA: No information
Supplier market share	0-100 Share of contract value won by supplier in a given market and year

IV. Limitations

Collecting and harmonizing public procurement data comes with specific difficulties. Procurement entities often have many exceptions to publishing public procurement data. For example, small value contracts are often exempted from publication requirements. This limits the coverage of the datasets used in ProACT, which include only the public procurement contracts made publicly available in open portals. However, as more countries adopt open data policies and publish more information on public procurement, the coverage of the ProACT datasets will also expand accordingly.

The data collection process is complicated by the global scale of the exercise, the large amount of records that need to be validated and analyzed, and the relatively long reference period.

Instability of the data sources. Portals can periodically change structures or, even more fundamentally, data sources can be moved to an entirely new government website. When these changes occur, this often implies fluctuations in the data quality for the same country. For example, a country would make the data available with a limited set of variables and then switch to a new portal where more information is published for newer contracts. As another example, even when there are no changes in public procurement portals, there might be changes in the classifications or codes used in the data (for example in terms of the product classification used or procurement entity IDs), or in the definition of variables (for example a central authority may be mentioned as the main procuring entity and later a lower level procuring entity is declared as the actual procuring entity), or in the relevant legislative framework (for example if new procurement procedures are introduced). This instability of the data sources is often reflected in varying data quality for a country's different sources and over time. The instability of the data sources implies that the data pipeline should be regularly updated (i.e. update the data collection and mastering processes, and the data processing steps) in order to reflect changes in the structure and format of the data and variable definitions. . It also implies that some URLs might not be active for all the time that data is used on ProACT and therefore ProACT users may not be able to retrieve all data from the original data sources.

Variations across countries. The quality and completeness of the published data vary across countries, which limits cross country analysis. While some countries publish tenders and contracts with more detailed information (such as the tender launch dates; notice publication dates, submission deadlines, award decision dates etc.) many other countries only publish a limited set of information. This curtails the scope of integrity risk indicators that can be calculated for each country. There are also variations in the reporting systems used by countries. Variations across countries in variable definitions, such as product classifications and procurement procedure types, constitute further challenges for cross-country analysis.

Typos and errors. The objective of ProACT is to build analytics on the open data publicly available. Attempting to correct errors and typos in procurement portals globally is beyond the scope of this project. On the contrary, raising awareness on data inaccuracy can create an incentive for governments and other data providers to invest in further improvements in data quality and completeness. Nonetheless, users of ProACT should be aware that the public procurement data made available on open portals might have typos and errors that may impact on the quality of the analysis. For example, there might be errors in dates, contract values, or other tender or contract information. As another example, for data sources without supplier IDs and procurement entities IDs, grouping of contracts has to rely on organization names, which may be written inconsistently or with typos, therefore making the associations between tenders/contracts and suppliers, or tenders/contracts and procuring entities less accurate.

Annex 1. Source list

We list all the data portals used to collect the national public procurement datasets by country. Data from countries not listed in Table A.1.1 come from either the WorldBank and/or the IADB source links.

Table A.1.1 Public procurement data portals by country

Country	Continent	Source Link
Armenia	Europe	https://www.armeps.am/ppcm/public/reports
Austria	Europe	http://ted.europa.eu, https://www.data.gv.at http://data.europa.eu/
Belgium	Europe	http://ted.europa.eu, http://data.europa.eu/
Bulgaria	Europe	http://www.aop.bg//
Chile	Americas	http://www.mercadopublico.cl
Colombia	Americas	https://www.datos.gov.co/Gastos-Gubernamentales/SECOP-I/nuxh-53y2
Croatia	Europe	https://eojn.nn.hr/
Cyprus	Europe	http://ted.europa.eu, http://data.europa.eu/
Czech Republic	Europe	https://vestnikverejnychzakazek.cz
Denmark	Europe	http://ted.europa.eu, http://data.europa.eu/
Estonia	Europe	https://riigihanked.riik.ee/
Finland	Europe	http://ted.europa.eu, http://data.europa.eu/
France	Europe	http://ted.europa.eu, http://data.europa.eu/
Georgia	Europe	https://tenders.procurement.gov.ge
Germany	Europe	http://ted.europa.eu, http://data.europa.eu/
Greece	Europe	http://ted.europa.eu, http://data.europa.eu/
Hungary	Europe	http://kozbeszerzes.hu
IADB	global/regional	https://www.iadb.org/en/projects-search?country=&sector=&status=&query=&projectTypeCombo=&fund=&finCurrency=&yearFrom=&yearTo=&fin

		ancialProd=&ESIC=&financingOver=&financingUnder=&projectNumber=, https://projectprocurement.iadb.org/en/procurement-notices , https://www.iadb.org/en/iadb_projects/form/search_awarded_contracts
Iceland	Europe	http://ted.europa.eu, http://data.europa.eu/
India	Asia	https://eprocure.gov.in/
Indonesia	Asia	http://inaproc.id/lpse/
Ireland	Europe	https://irl.eu-supply.com
Italy	Europe	http://ted.europa.eu, http://data.europa.eu/
Jamaica	Americas	http://www.ocg.gov.jm/ocg/view/gca-consol
Kenya	Africa	https://tenders.go.ke/website
Latvia	Europe	ftp://open.iub.gov.lv
Lithuania	Europe	http://cvpp.lt/
Luxemburg	Europe	http://ted.europa.eu, http://data.europa.eu/
Macedonia	Europe	http://ted.europa.eu, http://data.europa.eu/
Malta	Europe	http://ted.europa.eu, http://data.europa.eu/
Mexico	Americas	https://sites.google.com/site/cnetuc/descargas
Moldova	Europe	http://opencontracting.date.gov.md/
Netherlands	Europe	https://www.tenderned.nl
Norway	Europe	https://www.doffin.no/
Paraguay	Americas	https://www.contrataciones.gov.py
Poland	Europe	ftp://ftp.uzp.gov.pl , http://websrv.bzp.uzp.gov.pl
Portugal	Europe	http://www.base.gov.pt
Romania	Europe	http://data.gov.ro/
Slovakia	Europe	http://www.uvo.gov.sk https://www.eks.sk
Slovenia	Europe	http://www.enarocanje.si
Spain	Europe	http://contrataciondelestado.es https://www.hacienda.gob.es
Sweden	Europe	http://ted.europa.eu, http://data.europa.eu/
Switzerland	Europe	https://www.simap.ch

Uganda	Africa	http://gpp.ppda.go.ug/
United Kingdom	Europe	https://www.contractsfinder.service.gov.uk/
Uruguay	Americas	http://cuentasclaras.uy/?source=post_page----------#/database
US	Americas	https://www.usaspending.gov/#/search
WB	global/regional	https://projects.worldbank.org/en/projects-operations/projects-home, https://finances.worldbank.org/Procurement/Contract-Awards-in-Investment-Project-Financing/kdui-wcs3/data,

Table A.1.2 Sanction data portals

Dataset	**Link**
Asian Development Bank	http://lnadbg4.adb.org/oga0009p.nsf/sancALL1P?OpenView&count=999
African Development Bank Group	https://www.afdb.org/en/projects-and-operations/procurement/debarment-and-sanctions-procedures/
Bangladesh	http://www.cptu.gov.bd/debarment/debarment-list.html
Canada	https://www.tpsgc-pwgsc.gc.ca/ci-if/four-inel-eng.html
European Bank of Reconstruction and Development	https://www.ebrd.com/ineligible-entities.html
European Union (Commission) Development Bank	http://ec.europa.eu/budget/edes/index_en.cfm
Indonesia	http://inaproc.id/en/blacklist
Indonesia	http://inaproc.id/en/blacklist
Kenya	https://www.sam.gov/portal
Mexico	https://datos.gob.mx/busca/dataset/proveedores-y-contratistas-sancionados
Mexico	https://sanciones.cnbv.gob.mx/

Pakistan	http://www.ppra.org.pk/blacklist.asp
Pakistan	http://www.ppra.org.pk/blacklist.asp
Republic of the Philippines Government Procurement Policy Board	http://www.gppb.gov.ph/monitoring/blacklistedSup.php
Uganda	http://gpp.ppda.go.ug/page/suspended_providers
United Nations Development Programme	http://www.undp.org/content/undp/en/home/operations/procurement/business/protest-and-sanctions/ineligibility-list/
United Nations Office for Project Services	https://www.unops.org/business-opportunities/vendor-sanctions
WorldBank	http://web.worldbank.org/external/default/main?theSitePK=84266&contentMDK=64069844&menuPK=116730&pagePK=64148989&piPK=64148984
South African National Treasury	http://www.treasury.gov.za/publications/other/Database%20of%20Restricted%20Suppliers.pdf

Annex 2. Integrity Indicators definitions by country

Table A.2.1 Length of advertisement period thresholds by country

Country	Not a red flag (100)	Red flag level 1 (50)	Red flag level 2 (0)	Missing Included (L1: Red flag level1; L2: Red flag level 2)
GE	More than 13 days	8 to 13 days	Less than 6 days	No
CZ	More than 35 days	29 to 35 days	1 to 28 days	No
MT	More than 41 days less than 253 days	1 to 41 days & more than 253 days	-	No
UK	42-176 days	1-41 days OR >176 days	-	Yes (L1)
MX	More than 15 days	4-14 days	3 or less	No
WB	15-108	1-14		No
DE	49-183 days	35-48 days	1-34 days	No
PT	39-183 days	29-38 days	2-28 days	No
ES	36-183 days	1-35 days	-	No
RO	34-365	2-33		No
SK	32-96	3-19 & 97-365	20-31	No
NL	40-365	35-39	0-34, NA	Yes
SI	38-364	1-37		No
SE	35-365	1-34		No
BE	53-76	2-52	77-365	No
EE	24-364	11-23	1-10	No
HU	38-365	2-37		No
HR	34-365	2-33		No

PY	22-365	1-21		Yes
KE	<=21 days	>=22 days		No
UG	>246 days	37-245 days	1-36 days	Yes
AT	45-79 days	38-44 days & 80-365 days	2-37 days	No
CY	44-277	278-362	10-43	No
LU	41-354	2-40, NA		Yes
DK	52-364	1-51, NA		Yes
UY	73-114 or 156-183	36-72 or 115-155	1-35	No
MK	16-18&26-363	1-15&19-25		No
FI	31-365	3-30, NA		Yes
IE	79-364	3-78		No
IS	-	-	-	-
IT	42-101	102-365	1-41	No
LT	56-364	6-55		No
PL	34-131	1-33 & 132-365		No
FR	38-80	1-37	81-365	No
BG	28-38	1-27	39-73	No
ID	12-183	7-11	1-6	No
GR	48-183	1-47	-	Yes(L1)
LV	21-183	6-20	-	No
NO	49-183	29-48	1-28	No
CH	7-183	5-39 (if proc method is not risky =100)	-	No

CO	-	-	-	-
CL	9-157	7-8	4-6	No
IN	7-182	1-6	-	No

Table A.2.2 Length of decision period threshold red flags by country

Country	**Not a red flag (100)**	**Red flag level 1 (50)**	**Red flag level 2 (0)**	**Missing Included (L1: Red flag level1; L2: Red flag level 2)**
GE	15- 25 days	Less than 14 days, More than 26 days	-	No
CZ	49-365	29 to 48 days	Less than 28 days	No
MT	70-365	Less than 69 days		No
UK	64-365 days	1-63 days	-	No
MX	9-365 days	1-8 days	Less than 1 day	No
WB	For Consultancy procedure types: More than 100 days and less than 300 days. For non-Consultancy procedure types: More than 20 days and less than250 days.	For Consultancy procedure types: Less than or equals 100 days and more than or equals 300 days. For non-Consultancy procedure types: Less than or equals 20 days and more than or equals 250 days.		Yes (L1)
DE	73-365 days	1-72days	-	Yes (L1)
PT	88-365 days	47-87 days	1-46 days	Yes (L2)
ES	94-365 days	50-93 days	1-49days	Yes (L1)
RO	25-365	18-24,	0-17	Yes (L1)

SK	112-724	57-111	0-56	No
NL	75-162	34-74, 163-723	0-33	Yes (L1)
SI	84-210 days	39-83 days	0-38 days & 211-730 days & NA	Yes
SE	43-365	18-42	1-17	No
BE	91-365	59-91	0-58	No
EE	40-365	23-39	0-22	No
HR	93-365	53-92	0-52	No
HU	41-727	21-40	0-20	Yes (L2)
PY	63-189	28-62 & 190-732	0-27	Yes (L1)
KE	>=69 days	8-68 days	<=8 days	No
UG	6-183 days	1-5 days		No
AT	59-365 days	37-58 days	0-36 days	No
CY	63-715	53-63	0-52	No
LU	102-702	35-101, NA	0-34	Yes
DK	76-723	17-75	0-16	No
UY	29-42	12-28 or 43-131	1-11	No
MK	37-323	17-26&31-36	0-16&27-30	Yes (L1)
FI	100-715	37-99	0-36	No
IE	62-728	46-61	0-45	No
IS	28-113	0-27 & 114-699		Yes (L1)
IT	87-365	44-86	0-43	Yes (L1)
LT	64-718	25-63	0-24	Yes (L2)
FR	68-365	43-67	0-42	Yes (L1)

BG	45-365	33-44	0-32	No
ID	9-360	5-8	1-4	Yes (L2)
PL	33-721	23-33,	0-22	Yes (L1)
GR	163-365	117-162	1-116	No
LV	39-365	22-38	1-21	Yes(L2)
NO	88-365	38-87	1-37	Yes(L1)
CH	72-365	50-71	1-49	Yes(L2)
CL	19-183	9-18	1-8	Yes (L2)
CO	-	-	-	-
IN	-	-	-	-

Table A.2.3 Use of non-open procedure types risk categories by country

Country	**Not a red flag (100)**	**Red flag level 1 (50)**	**Red flag level 2 (0)**	**Missing Included (L1: Red flag level1; L2: Red flag level 2)**
GE	1. Donor electronic procurement procedure (DEP) 2. Electronic Tender (DAP) 3. Electronic Tender Without Reverse Auction (NAT) 4. Electronic Tender Without Reverse Auction (NAT) via price list 5. Simplified Electronic	1. Electronic Tender (SPA) 2. Electronic Tender (SPA) via price list 3. Simplified Electronic Tender (SPA) 4. Simplified Electronic Tender (SPA) via price list.	1. e-Procurement Procedure (GEO) 2. e-Procurement Procedure (GEO) via price list	No

	Tender Without Reverse Auction (NAT) 6. Simplified Electronic Tender Without Reverse Auction (NAT) via price list 7. Simplified Electronic Tender (DAP) 8. Simplified Two Stage Electronic Tender (MEP) 9. Two Stage Electronic Tender (MEP) 10. Two Stage Electronic Tender (MEP) via price list			
CZ	1.APPROACHING_BIDDERS 2.COMPETITIVE_DIALOG 3.DESIGN_CONTEST 4. DPS_PURCHASE 5.INOVATION_PARTNERSHIP 6.OPEN	1.RESTRICTED , 2.NEGOTIATED_WITH_PUBLICATION 3.NEGOTIATED	1.NEGOTIATED_WITHOUT_PUBLICATION 2. OUTRIGHT_AWARD	No
MT	1.COMPETITIVE_DIALOG 2. OPEN	1.RESTRICTED 2.NEGOTIATED_WITH_PUBLICATION 3.NEGOTIATED_WITHOUT_PUBLICATION		No
UK	1. OPEN 2. RESTRICTED	1.COMPETITIVE_DIALOG 2.INOVATION_PARTNERSHIP 3.NEGOTIATED 4.NEGOTIATED_WITH_PUBLICATION	1.NEGOTIATED_WITHOUT_PUBLICATION 2.OUTRIGHT_AWARD	Yes (L2)
SK	1.APPROACHING_BIDDERS 2.COMPETITIVE_DIALOG 3.DESIGN_CONTEST 4.OPEN	1.NEGOTIATED_WITH_PUBLICATION 2.OUTRIGHT_AWARD 3.RESTRICTED	1.NEGOTIATED 2.NEGOTIATED_WITHOUT_PUBLICATION	No

MX	1. OPEN AUCTION 2. OTHER 3. INT. DIRECT CONTRACTING 4. INT. INVITATION	1. NATIONAL - DIRECT CONTRACTING	1. NATIONAL INVITATION	Yes
WB	1. OPEN 2. RESTRICTED	1. CONSULTANCY, COST 2. CONSULTANCY, QUALITY	1. OWN PROVISION 2. SINGLE SOURCE	Yes
DE	1.COMPETITIVE_DIALOG 2.NEGOTIATED 3.OPEN	1.INOVATION_PARTNERSHIP 2..NEGOTIATED_WITH_PUBLICATION 3.RESTRICTED	1.NEGOTIATED_WITHOUT_PUBLICATION 2.OUTRIGHT_AWARD	Yes (L2)
PT	1. OPEN 2. RESTRICTED	1.NEGOTIATED 2.NEGOTIATED_WITHOUT_PUBLICATION 3.NEGOTIATED_WITH_PUBLICATION 4.OUTRIGHT_AWARD	-	Yes (L1)
ES	1.APPROACHING_BIDDERS 2.COMPETITIVE_DIALOG 3.DESIGN_CONTEST 4.OPEN 5.RESTRICTED	1.DPS_PURCHASE 2.NEGOTIATED 3.NEGOTIATED_WITH_PUBLICATION 4.OUTRIGHT_AWARD	1.INOVATION_PARTNERSHIP 2.NEGOTIATED_WITHOUT_PUBLICATION 3.OTHER	Yes (L1)
RO	1.COMPETITIVE_DIALOG 2.OPEN 3.RESTRICTED	1.APPROACHING_BIDDERS 2.NEGOTIATED WITH PUBLICATION	1.NEGOTIATED 2.NEGOTIATED W/O PUBLICATION	No
NL	1.COMPETITIVE_DIALOG 2.NEGOTIATED 3.NEGOTIATED_WITH_PUBLICATION 4.OPEN 5.RESTRICTED	1.OUTRIGHT_AWARD 2.INOVATION_PARTNERSHIP 3.NEGOTIATED_WITHOUT_PUBLICATION		Yes (L1)
SI	1.INOVATION_PARTNERSHIP 2.NEGOTIATED 3.OPEN 4.OUTRIGHT_AWARD 5.RESTRICTED	1.NEGOTIATED_WITH_PUBLICATION 2.COMPETITIVE_DIALOG	1.NEGOTIATED_WITHOUT_PUBLICATION	Yes (L1)
SE	COMPETITIVE_DIALOG, INOVATION_PARTNERSHIP, NEGOTIATED_WITHOUT_PUBLICATION, ,	NEGOTIATED, OURIGHT_AWARD		No

	NEGOTIATED_WITH_PUBLICATION, OPEN, RESTRICTED			
BE	INOVATION_PARTNERSHIP, NEGOTIATED_WITH_PUBLICATION, OPEN	RESTRICTED, NEGOTIATED,COMPETITIVE_DIALOG	NEGOTIATED_WITHOUT_PUBLICATION, OUTRIGHT_AWARD	No
EE	COMPETITIVE_DIALOG, DESIGN_CONTEST, NEGOTIATED_WITH_PUBLICATION, OPEN, PUBLIC_CONTEST, RESTRICTED	OTHER, OUTRIGHT_AWARD, NEGOTIATED	NEGOTIATED_WITHOUT_PUBLICATION, CONCESSION	No
HU	1.APPROACHING_BIDDERS 2.OPEN 3.OTHER (incl. COMPETITIVE_DIALOG & OUTRIGHT_AWARD)	1.NEGOTIATED_WITHOUT_PUBLICATION 2.NEGOTIATED 3.NEGOTIATED_WITH_PUBLICATION	1.RESTRICTED	Yes (L2)
HR	COMPETITIVE_DIALOG, NEGOTIATED, NEGOTIATED_WITH_PUBLICATION, OPEN, RESTRICTED	NEGOTIATED_WITHOUT_PUBLICATION, NA	-	Yes (L1)
PY	1.limited 2.open auction	1.open within threshold	1.direct contracting 2.other	No
KE	APPROACHING_BIDDERS OPEN RESTRICTED	DPS_PURCHASE OUTRIGHT_AWARD OTHER		No
JM	OPEN	OTHER OUTRIGHT_AWARD RESTRICTED		No
UG	1.approaching bidders 2.open 3. Negotiated without publ	Restricted		Yes (L1)

AT	APPROACHING_BIDDERS, NEGOTIATED, NEGOTIATED_WITH_PUBLICATION, OPEN, RESTRICTED	OUTRIGHT_AWARD, INOVATION_PARTNERSHIP, COMPETITIVE_DIALOG	NA, NEGOTIATED_WITHOUT_PUBLICATION	Yes (L2)
CY	1.COMPETITIVE_DIALOG 2.OPEN 3.NEGOTIATED 4.NEGOTIATED_WITH_PUBLICATION 5.OPEN 6.RESTRICTED	1.NEGOTIATED_WITHOUT_PUBLICATION		Yes (L2)
LU	1.COMPETITIVE_DIALOG 2.INOVATION_PARTNERSHIP 3.NEGOTIATED 4.NEGOTIATED_WITH_PUBLICATION 5.OPEN 6.RESTRICTED	1.NEGOTIATED_WITHOUT_PUBLICATION	1.OUTRIGHT_AWARD	Yes (L1)
DK	1.COMPETITIVE_DIALOG 2.INOVATION_PARTNERSHIP 3.NEGOTIATED 4.NEGOTIATED_WITH_PUBLICATION 5.OPEN 6.RESTRICTED	1.NEGOTIATED_WITHOUT_PUBLICATION 2.OUTRIGHT_AWARD		Yes (L2)
UY	1.OPEN 2.OTHER	1.RESTRICTED	1.OUTRIGHT_AWARD	No
MK	COMPETITIVE_DIALOG, NEGOTIATED, NEGOTIATED_WITHOUT_PUBLICATION, NEGOTIATED_WITH_PUBLICATION, OPEN	RESTRICTED		No

FI	1.COMPETITIVE_DIALOG 2.INOVATION_PARTNERSHIP 3.NEGOTIATED 4.OPEN 5.RESTRICTED	1.NEGOTIATED_WITH_PUBLICATION	1.NEGOTIATED_WITHOUT_PUBLICATION	Yes (L2)
IE	1.COMPETITIVE_DIALOG 2.INOVATION_PARTNERSHIP 3.OPEN 4.OUTRIGHT_AWARD 5.RESTRICTED	1.NEGOTIATED_WITH_PUBLICATION 2.NEGOTIATED_WITHOUT_PUBLICATION 3.NEGOTIATED		Yes (L1)
IS	1.OPEN 2.NEGOTIATED 3.NEGOTIATED_WITH_PUBLICATION	1.COMPETITIVE_DIALOG 2.NEGOTIATED_WITHOUT_PUBLICATION 3.RESTRICTED		Yes (L1)
IT	OPEN, COMPETITIVE_DIALOG, NEGOTIATED, NEGOTIATED_WITH_PUBLICATION	RESTRICTED, INOVATION_PARTNERSHIP	NEGOTIATED_WITHOUT_PUBLICATION, OUTRIGHT_AWARD	YES (L2)
LT	1.COMPETITIVE_DIALOG 2.NEGOTIATED 3. NEGOTIATED_WITH_PUBLICATION 4.OPEN 5.OUTRIGHT_AWARD 6.RESTRICTED	1.NEGOTIATED_WITHOUT_PUBLICATION		Yes (L1)
PL	1.OPEN 2.APPROACHING_BIDDERS 3.INOVATION_PARTNERSHIP 4.NEGOTIATED	1.NEGOTIATED_WITH_PUBLICATION 2.COMPETITIVE_DIALOG 3.RESTRICTED	1.NEGOTIATED_WITHOUT_PUBLICATION 2.OUTRIGHT_AWARD	No

FR	OPEN, COMPETITIVE_DIALOG, INOVATION_PARTNERSHIP, NEGOTIATED, RESTRICTED	NEGOTIATED_WITH_PUBLICATION	NEGOTIATED_WITHOUT_PUBLICATION, OUTRIGHT_AWARD	Yes (L2)
BG	OPEN	NEGOTIATED, NEGOTIATED_WITH_PUBLICATION, RESTRICTED	NEGOTIATED_WITHOUT_PUBLICATION, OUTRIGHT_AWARD, COMPETITIVE_DIALOG	Yes (L1)
ID	1.OPEN 2.RESTRICTED	1.OUTRIGHT_AWARD 2.OTHER		No
CH	1.OPEN 2.RESTRICTED 3.NEGOTIATED 4.NEGOTIATED WITHOUT PUBLICATION	1.NEGOTIATED WITH PUBLICATION	-	No
NO	Negotiated Open Restricted	Competitive dialog Negotiated without publication Negotiated with publication	-	Yes (L1)
LV	Open Restricted	Negotiated Competitive dialog Negotiated without publication Negotiated with publication Outright award		Yes (L1)
GR	Open Restricted Competitive dialog	Negotiated Negotiated without publication Negotiated with publication		No
CL	Open	Restricted		No
CO	Open other	selective	Direct limited	No
IN	Concession Open	Negotiated Restricted	Outright award	Yes (L1)

Table A.2.4 Call for tenders publication definition by country

Country	Red flag (0)
RO	YES
SK	YES (interaction w/ procedure type) valid for procedure types “NEGOTIATED_WITHOUT_PUBLICATION” & “NEGOTIATED”
NL	YES
SI	YES
UK	YES
DE	YES
ES	YES
PT	NO
SE	YES
BE	YES
EE	YES
HR	YES
HU	NO
PY	YES
KE	YES
JM	NO
UG	YES
AT	YES
CY	NO
LU	NO

DK	NO
UY	YES
MK	YES (interaction w/ procedure type) valid for procedure types: RESTRICTED & NEGOTIATED
FI	YES (interaction w/ procedure type) valid for procedure types: “NEGOTIATED_WITHOUT_PUBLICATION” & “NA/missing”
IS	NO
IT	YES (interaction w/ procedure type) valid for procedure types:COMPETITIVE_DIALOG or INOVATION_PARTNERSHIP
LT	YES
FR	YES
BG	YES
ID	YES
PL	NO
GR	YES
LV	YES
NO	YES
CZ	YES
IE	YES
MT	YES
CH	YES
GE	YES
CL	YES (interaction w/ procedure type) valid for procedure types: Non-risky
CO	YES
IN	NO

MX	YES

Table A.2.5 Benford's Law thresholds by country

Country	Included	Not a red flag (100)	Red flag level 1 (50)	Red flag level 2 (0)
RO	YES	MAD= 0.003 -0.0232	MAD= 0.023 - 0.12	
SK	YES	MAD= [0.0053542 ,0.0219899]	MAD= [0.0221132,0.0381124]	MAD = [0.0381815,0.1237699]
NL	NO			
SI	YES	MAD = [0.0057323,0.0148728]	MAD= [0.0150139 ,0.1142706]	
UK	YES	MAD=0.0064865-0.014941	MAD=>0.0150097	
DE	YES	MAD=0.0046788-0.0119974	MAD=>0.012052	
ES	YES	MAD=0.003583-0.0119378 OR MAD=>0.0150152	MAD=0.0120295- 0.0149513	
PT	YES	MAD=	MAD=	
SE	NO			
BE	YES	MAD=0.0080189-0.0110045	MAD=0.0111228-0.1056848	
EE	YES	"Acceptable conformity","Close conformity"	"Marginally acceptable conformity"	"Nonconformity"
HR	NO			
PY	YES	MAD = [0.0034403,0.0251515]	MAD = [0.0255004, 0.1224917]	
KE	YES	<0.0121942 OR >0.0140353	0.0121942-0.0140353	
JM	NO			
UG	NO			
AT	YES	<.0560001	>.0560001	

CY	NO			
LU	NO			
DK	YES	MAD = 0.0032515 & MAD>0.0210294	MAD = [0.0121542 ,0.0206239]	
UY	NO			
MK	NO			
FI	YES	"Acceptable conformity","Close conformity"	“Marginally acceptable conformity”, “Nonconformity”	
IE	NO			
IS	NO			
IT	NO			
LT	YES	MAD = [0.0054983,0.0118203]	MAD = [0.0120377 ,0.014434]	MAD = [0.0151469 ,0.1717236]
FR	YES	"Acceptable conformity","Close conformity"	“Marginally acceptable conformity”	“Nonconformity”
BG	NO			
ID	YES	"Acceptable conformity","Close conformity", “Marginally acceptable conformity”	“Nonconformity”	
PL	YES	MAD = [0.0020891,0.022049]	MAD = [0.0220523,0.1972441]	
CH	YES	MAD=0.0115896-0.0211256	MAD=0.0223815-0.121927	

Table A.2.6 Supplier is registered in a tax haven - by country

Country	Red flag (0)
RO	YES
SK	YES
NL	YES
SI	YES
UK	NO
DE	YES
ES	YES
PT	NO
SE	YES
BE	NO
EE	YES
HR	YES
HU	YES
PY	YES
KE	NO
JM	NO
UG	NO
AT	YES
CY	NO
LU	YES

DK	YES
UY	NO
MK	YES
FI	YES
IE	NO
IS	NO
IT	YES
LT	YES
FR	YES
BG	YES
PL	YES
CH	NO

Table A.2.7 Cost Overrun definition by country

Country	**Red flag (0)**
UG	Yes
PT	Yes
US	Yes
CO	Yes

Table A.2.8 Delivery delay definition by country

Country	**Red flag (0)**
CO	Yes
US	Yes