

**PILOT STUDY ON MOBILE-ENABLED PRICE DATA COLLECTION  
METHODOLOGY AND LESSONS LEARNED**

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## Introduction

This document describes the methodology and general lessons learned during a six-month pilot<sup>1</sup> commissioned by the World Bank's International Comparison Program (ICP) unit to utilize modern information and communications technology (ICT) to conduct a price survey of approximately 160 goods and services across urban and rural areas in Brazil, Indonesia and Nigeria. The aim of the pilot is to determine whether modern ICT, in the form of the Premise Data Corporation platform described below, could be utilized to augment and inform the estimation of national and sub-national purchasing power parities (PPPs), and contribute to other research topics related to price levels and poverty. Specifically, the objectives of the pilot are to study the possibility of:

- Covering a relevant and complete basket of goods and services for household consumption; and
- Achieving a representative set of national average prices through sampling frames, including both rural and urban areas.

To further examine the feasibility of the approach, the pilot is currently being extended to cover 12 additional countries, namely Argentina, Bangladesh, Cambodia, Colombia, Ghana, Kenya, Malawi, Peru, Philippines, South Africa, Venezuela and Vietnam<sup>2</sup>. In addition to the extended country coverage, the second phase of the pilot is featuring several adjustments to the overall approach based on lessons learned during the first phase of the pilot, especially in relation to improving data quality and survey coverage.

## Background

### International Comparison Program

The ICP is a worldwide statistical partnership that collects comparative price data and compiles detailed expenditure values of countries' gross domestic products, and estimates PPPs of the world's economies. Using PPPs instead of market exchange rates to convert currencies makes it possible to compare the output of economies and the welfare of their inhabitants in real terms by controlling for differences in price levels. In order to estimate PPPs for the world's economies, the ICP conducts price surveys and collects national accounts expenditure data for all goods and services that make up the gross domestic product.

### Premise

Premise is an information technology firm that combines a global network of on-the-ground contributors, a specialized smartphone application, and advanced tasking technology to gather and analyze detailed price data. Premise recruit's citizen enumerators, also referred to as contributors, around the world using a smartphone application to collect data. This application instructs contributors on what data to collect, where to collect it, and how to collect it. The application is driven by a dynamic tasking system that attempts to efficiently match up the need for data with the availability of

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<sup>1</sup> Phase I of the pilot was conducted in 2015.

<sup>2</sup> Phase II of the pilot is being conducted in 2016.

contributors. Finally, every data points captured by contributors are passed through a quality control process to ensure that they correctly reflect the data points requested of them.

## Goals of the Pilot

The goal of this pilot was to evaluate the feasibility of using the Premise platform to provide detailed price data for various uses. More specifically this pilot was designed to test several specific aspects of crowdsourcing price data collection using the Premise platform:

- *Geographical reach.* Availability of granular sub-national price data, and prices covering rural areas, is typical. Thus the ability to gather data from multiple locations, including rural areas, through the approach will be tested.
- *Item variety.* The Premise platform has long been used to capture food price. However, prior to this pilot it has not been used to capture the prices of products and services. A key goal of this pilot was to determine the extent to which the Premise Platform could capture the prices of these items – particularly hard to capture items such as dwelling rents, fast changing technological goods, private healthcare, and private education.
- *Item specificity.* A key challenge of the ICP price surveys has been to ensure that the items surveyed in various countries are comparable with each other. Part of this pilot was to determine the extent to which Premise contributors were able to both follow strict item definition as well as capture auxiliary features of the product.
- *Venue type coverage.* A consistent challenge for the ICP has been getting data from a representative set of venues. Selecting a representative sample of venues requires understanding the universe of venues as well as the volume of their sales. The goal of this pilot was simply to determine if the Premise platform was capable of collecting data from a variety of venue types.

## Sampling Framework

In order to test the suitability of the approach, the pilot was designed to cover:

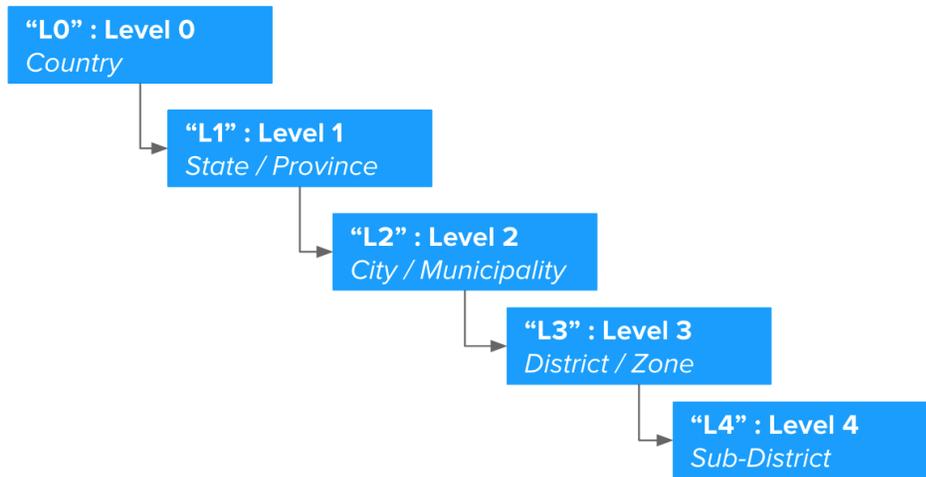
- Geographically comprehensive operation in urban, semi-urban, and rural areas;
- Wide variety of items, including food, products, and services; and
- Variety of venue types: large shops, small and medium shops, open air markets, street vendors, and discount stores to name a few.

## Geospatial Survey Framework

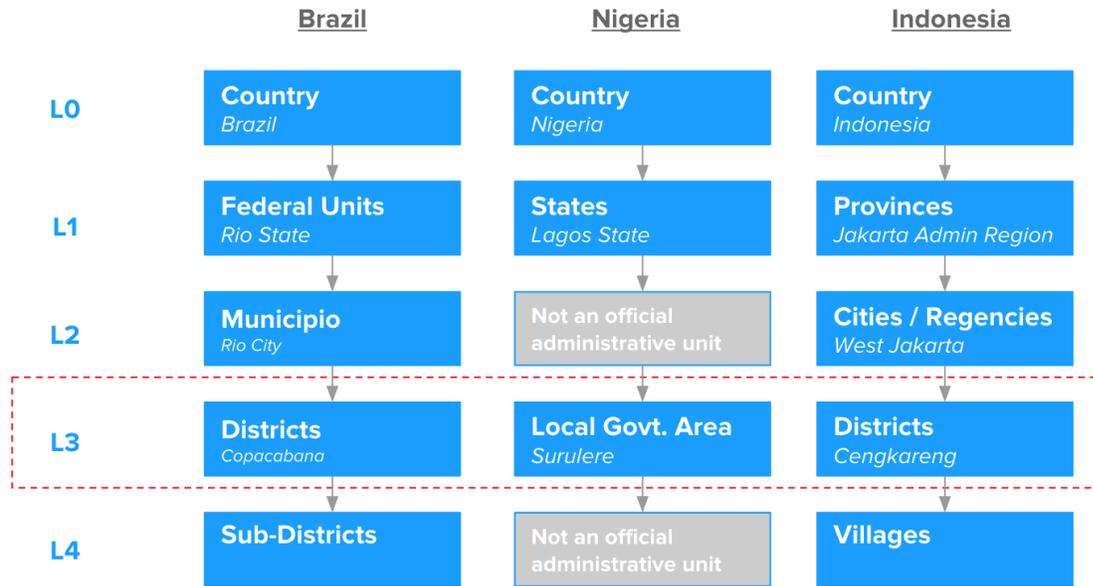
The World Bank and Premise have collaboratively selected a set of specific locales to deploy the Premise platform. This set of locations ultimately selected were designed both to present a comprehensive view of each of the three countries in the pilot, as well as to test the ability of the platform to operate in a wide variety of conditions, as listed below.

**1. Divided the country into spatial units across hierarchical levels.** Countries around the world use different nomenclatures to define spatial units and adopt different approaches in organizing them into administrative divisions. Some countries have more administrative layers than others, and a “city” may

be a second-level administrative division in one country (e.g., Canada) and a third-level administrative division in another (e.g., United States). For this pilot and in order to establish comparability across countries when describing spatial units, the organizational schema presented below was developed. The schema consistently defines the country level as Level 0 (“L0”), the state or province level as Level 1 (“L1”), the city or municipality level as Level 2 (“L2”), the sub-city district or zone level as Level 3 (“L3”), and the sub-district or -zone level as Level 4 (“L4”), which may not necessarily coincide with each country’s official administrative hierarchy.



**2. Determining the hierarchical level at which the sampling frames will be selected.** Because the number of administrative layers vary from country to country, population datasets do not exist at every level for every country. As such, in order to maximize the granularity and specificity of sampling frame selection while preserving approach consistency across countries, we selected L2 as the appropriate level at which to select sampling frames for phase one of this pilot. The table below illustrates how the project’s organizational hierarchy maps to each country’s official administrative divisions, with the chosen L3 level highlighted.



**3. Selecting the sampling frames that cover the country across key demographic / socioeconomic strata.** The World Bank-ICP team and Premise opted for sampling frames that would ensure adequate country coverage with respect to population, population density and degree of urbanization. It should be noted that in the absence of a universally accepted definition of urban stratification, the team relied on national definitions of a spatial unit's degree of urbanization. These definitions are generally those used by national statistical offices in carrying out the latest census.

With the above framework in mind, the World Bank-ICP and Premise teams selected, for each country, the L1 and L2 units to target. These areas were heuristically selected to include:

- Major population centers;
- Rural, Semi-urban, and Urban areas;
- Remote areas with limited access; and
- Poor areas.

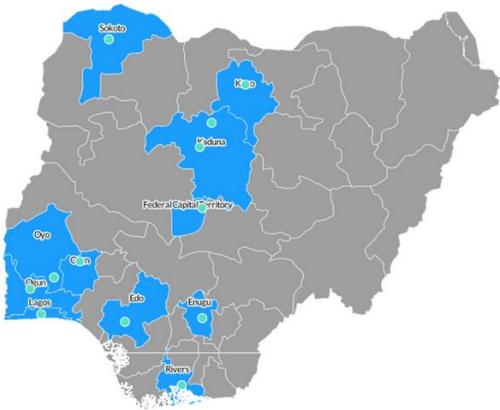
Within each L2, the user base was allowed to select their preferred L3s. This likely introduced bias into the sample. Premise contributors are not representative of the population in most of these countries, and they are on average wealthier and better educated. As a result, the L3s they picked were likely the more urbanized/wealth areas within a L2. In future phases, more effort may be placed on counteracting this bias through actively targeting specific venue and specific L3s.



Country (L0) view of Brazil with selected Federal Units (L1) and Cities (L2)



City (L2) View of Rio de Janeiro City with selected Districts (L3)



Country (L0) view of Nigeria with selected States (L1)



State (L1) view of Lagos State with selected Local Government Areas (L3)



Country (L0) view of Indonesia with selected Provinces (L1) and Cities (L2)



Cities / Regencies (L2) View of West Nusa Tenggara (L1) with all districts (L3)

## Items to Survey

For this pilot, and based on consultation with the World Bank-ICP team, Premise is collecting data for 164 survey items from the ICP Global Core List across the following categories:

Category	Number of Items
Food	66
Consumer products	62
Services	36
<b>Total</b>	<b>164</b>

The items selected were not necessarily meant to be representative of the consumption patterns in the three countries under study, rather they were selected to test the ability of Premise contributors to gather data requested of them. Some items were selected because they would be likely difficult to find, while others were selected because their specifications would be readily understood by contributors.

Furthermore, the item list selected for this product did not adhere perfectly to the product specifications in the ICP Global Core List. In many cases, dimensions that would normally be specified, such as brand or packaging, were left unspecified but were required to be collected by the contributor. This was done to understand how certain dimensions, such as packaging, differed from country to country. The complete list of items is found in the Annex.

## Survey Venues

Because the price of an item can vary depending on the outlet type where it is sold, the World Bank-ICP team identified nine different outlet types to be included during the survey process. Seven of these are retail category venues from which food and consumer products prices would be collected, and two are non-retail category venues from which services' prices would be collected.

Item Category	Outlet Type	Outlet Description / Examples	Examples of Items Sold
Food and consumer products	Large shops	Hypermarkets, supermarkets, department stores	Food, groceries, household products, clothing, hardware, furniture, electronics, toys
	Medium-size and small shops	Mini-markets, kiosks, neighborhood shops, grocery stores, convenience stores	Food, groceries, newspapers, cigarettes, convenience products
	Markets	Open markets, covered markets, wet markets	Food
	Street outlets	Mobile shops, street vendors	Food, merchandise, convenience products
	Bulk and discount shops	Wholesale stores, discount shops	Various consumer products
	Specialized shops	Supply shops, hardware shops, furniture shops	Hardware, furniture, electronics

	Other kinds of trade	Online shopping sites, catalogue orders	Various consumer products
Services	Private service providers	Taxicabs, hotels, restaurants, private schools, private hospitals, etc.	Transportation, lodging, dining, private education, private healthcare services, etc.
	Public or semi-public service providers	Water suppliers, electric power companies, public schools, public hospitals, etc.	Utilities, public education, public healthcare services, etc.

In order to capture possible price effects across different outlet types, Premise’s on-the-ground contributors were deployed to collect prices for each product from as many different outlet types as possible within each locale, recognizing that not every product would be available at every outlet type.

Contributors were free to select their preferred venues within each L2. In an ideal situation, a census of venues for each L2 along with some information indicate the volume of sales for each L2 would be available; and it would be possible to target specific venues and ensure a representative mix of venue types. However, without access to any such dataset for the pilot, the Premise platform was operated in discovery mode, allowing users to price items at their preferred venues.

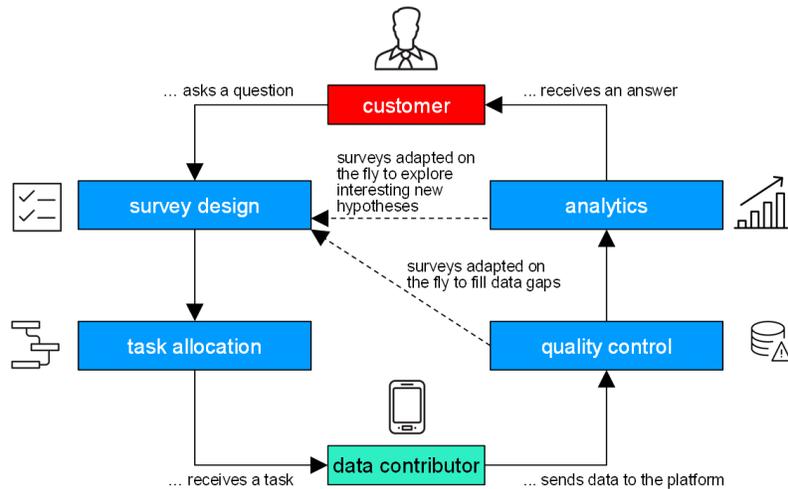
By allowing contributors to select their preferred venues, it is likely that some bias was introduced into the sample. As was mentioned earlier, the Premise contributor base is not representative of the population of the countries under study. As a result, their preferred venue may not be representative of the consumption pattern of the overall population.

Contributors were also asked to classify each venue using the ICP venue typology. As part of the pricing working flow, contributors are asked to either check-in to an existing venue or create a new venue. If a user chooses to check-in to an existing venue than the contributor will not be asked any further questions, provided they are within 50 meters of the venue that they selected. If a user chooses to create a venue, then that user will be asked to take a picture of the venue, enter the name of the venue, and to classify the venue. User created venues are de-duplicated and made available to other contributors within 5-7 days of creation.

## The Premise Platform

### Platform Overview

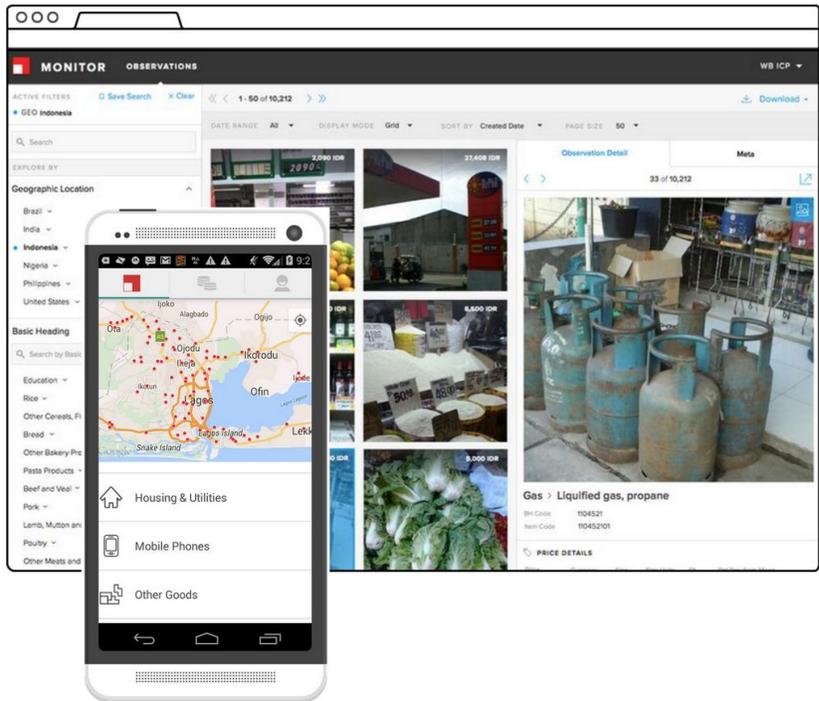
The Premise Platform is designed to gather a broad array of data. At the core of the platform is an iterative process by which a question is broken down into a set of tasks, which are then distributed to contributors with photo-enabled smartphones. Contributors complete these tasks and submit the data for review. The data then goes through a stringent set of quality controls. The data that makes it through quality control is then incorporated into a relevant set of analytics, which inform iteration on the survey. The following figure illustrates this iterative process:



- **Task design** involves the translation of high-level questions into precise tasks. As contributors are typically not professional survey enumerators, large surveys are broken up into discrete tasks that can be completed by many contributors, each task is meant to be self-contained and easily understandable. In this case, each item in the basket was designed so that it was clear to contributors what they needed to price as well as what additional information about each item they needed to capture;
- **Task allocation** is the process of distributing individual survey tasks to Premise contributors via the app. Dynamic task allocation balances the requirements of the survey against the number and preferences of the data contributors. The goal of the task allocation engine is to collect, as efficiently as possible, only as much data as needed;
- **Contributor management** refers to the recruitment and cultivation of a sufficient base of contributors in the geographies of interest. There is a structured process for targeting individuals, getting them onto the platform, and converting them into engaged, regular users;
- **Quality control** combines both machine intelligence and human reviews to verify observations as they are submitted, identifying erroneous or fraudulent observations, and surfacing deficiencies in the survey design;
- **Analytics** involves transforming clean observations from quality control into usable data streams, derived indicators, alerts and predictive outputs. In this case, it refers primarily to normalizing and cleaning the data as prescribed by the ICP methodology.

## Task Design, Allocation and Deployment

A key aspect of the Premise platform's approach is the ability to break down large, complex survey questions into smaller, structured, unambiguous tasks that a contributor—who is not a professional enumerator—can easily understand and complete. These tasks are pushed out to contributors via a smartphone application.



When developing a set of tasks for a new data collection campaign, tasks are designed to elicit responses that are:

- Capable of capturing rich information about the products or locations being surveyed;
- Easily verifiable in terms of their accuracy, and
- Conducive to error and fraud detection through automated and / or manual quality control.

For this pilot, Premise developed a process to convert the ICP’s detailed specifications list to individual survey tasks for each item on the list. Each task includes the relevant descriptive details for an item and requests contributors to identify the price, brand, and packaging size of the product, along with the venue and venue type it was found in. This ability to convert detailed specifications into discrete tasks is crucial to being able to roll out changes to the specifications list on a real-time basis to all survey locations simultaneously.

In contrast to traditional surveying approaches, whereby surveyors are directed to a pre-specified list of venues, Premise’s adaptive survey platform can operate in two modes, one of which provides contributors the opportunity to discover new venues, which in turn can lead to the uncovering of unanticipated price trends and patterns. For this pilot, contributors were initially tasked to focus on discovery, and switched emphasis to validation over time.

In discovery mode, contributors are invited to visit venues of their choosing within a certain sampling frame to look for the products and services being surveyed. Contributors report on the outlets they visit, on the products and services offered at each venue, and on the price, brand, and packaging size of each item.

In validation mode, a *different* set of contributors are directed to the outlets identified during discovery mode to confirm their location, offering, and product information. Drastic variations in the price of an item are noted for further review through automated and manual quality control processes.

For this pilot, discovery was prioritized over validation until the required number and variety of outlets were surveyed to produce statistically significant outputs. After enrolling the required number of outlets, approximately 20% of contributors continued to be dedicated to discovering new outlets, especially in relatively underrepresented areas of a region, in order to allow for the discovery of unanticipated trends or patterns.

Depending on the type of product or service and the specificity of its definition, observations from a different number of outlets types is required each month to arrive at a reliable view of average price.

## Network Recruitment and Management

Premise's network of on-the-ground contributors consists of residents in the geographies in selected locations. These individuals are recruited via social-media and other online channels, they are trained through a combination of in-app training and communications with the Premise network operations team. To help retain and engage contributors, Premise fosters a sense of community by creating online forums where contributors can interact with each other such as Facebook page and WhatsApp<sup>3</sup> groups. The Premise Platform has contributor quality modeling and scoring system that allows to analyze contributor performance, identify problem areas, and target specific contributors for additional training or, when warranted, discharge.

One of the keys to a cost-efficient and product network are "super-users". Super-users are defined as contributors who:

- Rely on Premise as a regular source of income;
- Are committed to regularly submitting high volumes of high quality data;
- Provide feedback on how to improve the in-app user experience; and
- Actively communicate their belief in the Premise mission to others.

Super-users are crucial to the health of the contributor network because they act as local, on-the-ground Premise advocates. Given their high level of commitment to and trust in Premise, they are typically willing to expand their travel radius to capture additional data and usually contribute a disproportionate amount of data relative to the overall base of contributors.

Super-users sometimes take on management roles in Premise online communities; they help answer contributor questions, recruit new contributors to the network, and increase data quality across the board. They also provide invaluable feedback on the geographies that Premise is operating in, communicating any issues or nuances with respect to data collection that can be quickly incorporated into surveys.

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<sup>3</sup> WhatsApp Messenger is a cross-platform messaging client for smartphones. It uses the Internet to send messages, documents, images, video, user location and audio messages to other users using standard cellular mobile numbers.

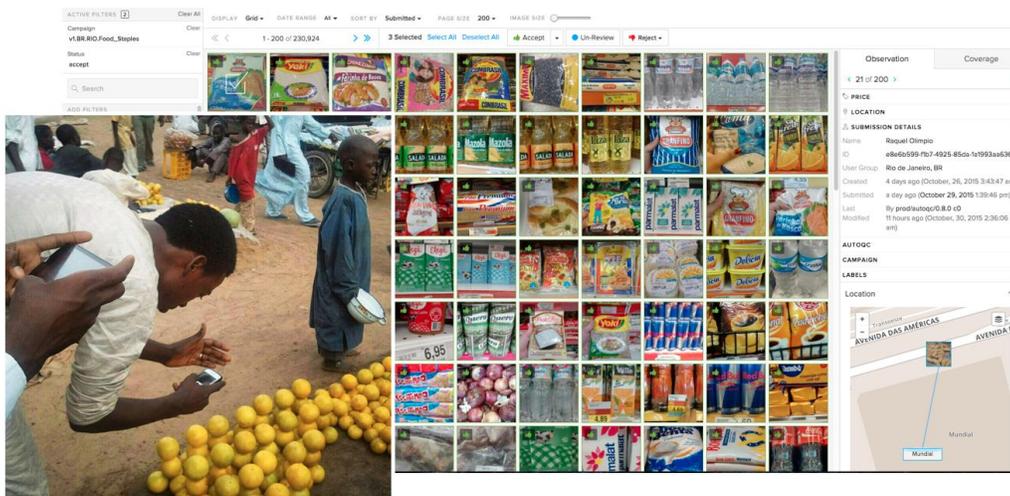
## Quality Assurance, Normalization and Validation

Every data point received by Premise is subject to a quality control process, which contains both steps generic to all data captured by Premise and steps specific to this pilot project. Quality assurance actually begins at the point of data capture, with a requirement that each observation be accompanied by some form of evidence that can then be used to verify that data point. Each data point is then subject to a set of *Fraud and Error detection* algorithms. Those observations that are not eliminated by these algorithms are then manually reviewed. Finally, ICP-specific rules regarding packaging size, price normalization, and outlier detection are applied.

## Evidence

Premise collects a comprehensive set of metadata with each observation, including a picture of the item being observed. The figure below illustrates an example from Premise's tool for managing the Quality Control process. This metadata is the foundation of their quality control process.

*Observation metadata is visible on the right: timestamps, contributor details and geographic coordinates*



Each metadata field can easily be verified and cross-checked against other fields. Figure below is a specific example from an existing survey showing how Premise performs both primary and secondary verification of various metadata fields, as well as the reasoning behind each request.

DATA POINT	USE CASE	PRIMARY VERIFICATION	SECONDARY VERIFICATION
Price	Tracking variance in place	Picture of item with price visible	Independent validation (explained in next section)
Brand	Tracking brand-dependent variance in price	Picture of item with brand visible	Statistical price analysis (explained in next section)
Packaging Size	Tracking packaging size-dependent variance in price	Picture of item with packaging visible	Statistical price analysis (explained in next section)
Venue	Tracking venue-dependent variance in price	Picture of venue	Place check-in and device location stamp
Item Picture	Verification for other fields	Image duplication detection (explained in next section)	N/A
Venue Picture	Verification for venue field	N/A	N/A
Place Check-in	Enrichment of venue field with address and other third-party data	Device location stamp	N/A
Location (Device Location)	Verification for venue field	N/A	N/A
Time (Device Timestamp)	Verification for other fields	N/A	N/A

Item and venue pictures are especially valuable for the detection of many different types of error and fraud. Below is an example of fraud (featuring three ostensibly distinct contributors) that was identified using the pictures submitted with each observation.

*During a Premise data collection campaign in Kenya, Premise’s automated data quality systems detected the same item being submitted by 3 different contributors. In this case, pictures and location metadata can be used to easily confirm these were indeed fraudulent submissions.*

“Muasya Moses”



“Gachie Thomas”



“Antony Wanjohi”



## Automated Error and Fraud Detection

As stated above, the Premise quality control process incorporates both automated and manual elements. In instances where the automated quality control system identifies potential error or fraud but cannot make a definitive determination, the user submission is flagged for further evaluation by human quality control reviewers.

Signals that are used to identify incorrectly captured and/or fraudulent data include, but are not limited to:

### 1. Metadata:

**a. Location:** User locations are validated and cross referenced at the point of price capture, and during the quality control process. Recorded location of the contributor is examined and automatically discard observations that are outside of a configurable radius from the intended venue's location. Additionally, it is identified when users attempt to submit observations that appear to be from multiple venues (by manually changing the venue name) - but have identical GPS coordinates. Below is an example of observations from ostensibly distinct venues with identical GPS coordinates.

The image displays a mobile application interface with four rows of price observations. Each row shows a grid of product images with their respective prices and a red box highlighting the venue name. The venue names are: 'Slo. Nifo', 'Slo. Nifo', 'Green Meadows Subdivision', and 'Slo. Nifo'. To the right of the observations, a text box states: 'Contributor reported different locations but mobile app's geo coordinates (on the right) revealed data collection occurring in the same place'. Below this text are four satellite maps, each with a red location pin. Arrows point from the text box to the red boxes on the observation rows and to the location pins on the maps, illustrating that all observations were collected at the same location despite the different venue names.

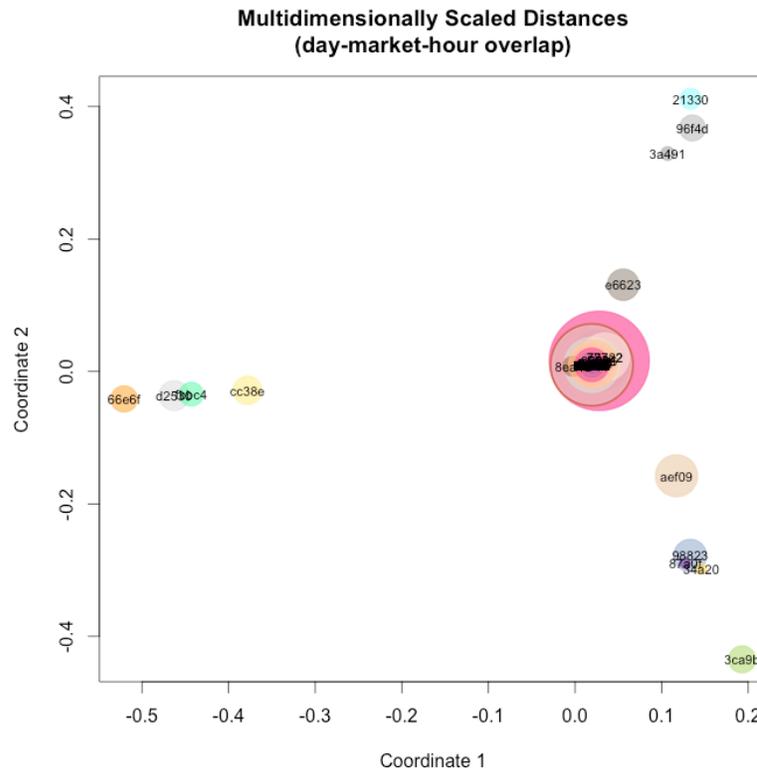
**b. Price:** Item prices are flagged when the contributor submits a price observation significantly outside a reasonable range of prices for the currency, product, brand, and packaging size in question. In the case pilot, final determination on whether a price was outside reasonable boundaries was postponed until the ICP specific quality control stage.

**c. Additional Manually Entered Fields:** For all products the size, quantity, and units of measure are verified. This eliminates a common class of errors in which users incorrectly enter the size or the unit measure associated with a product. These checks are intentionally performed outside of the app to account for the possibility of product packaging changes over time or country.

**d. Image:** Image analysis is one of the most important sources of signal for the Premise fraud and error detection system. The presence of images that are duplicates, images that are very similar to one another, images that appear to have been photographed off a computer screen, etc. are used to flag observations.

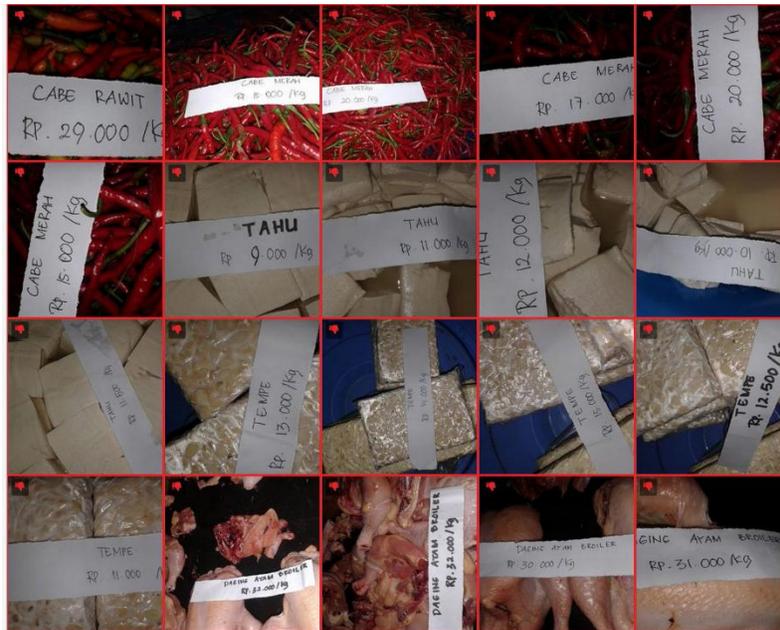
**2. Contributor Behavior:** The Premise platform is designed to detect a wide range of contributor behaviors that correlate with poor data quality and higher costs. Warnings and behavioral nudges are surfaced in the app to discourage these behaviors.

**a. Overlapping contributors:** A single data contributor operating multiple accounts, or groups of contributors capturing the exact same data can be identified by session overlaps and other correlations in the venues visited. The graph structure of this data can be explored to identify clusters of fraudulent activity. Figure below shows an example of a contributor overlap graph projected into two dimensions via multidimensional scaling. Clusters in the matrix can indicate group collaboration fraud behavior.



**b. Duplicate data:** Another common fraud pattern consists of users attempting to submit the same product multiple times at the same location, often accompanied by slight changes in price with each submission. Observations submitted under the same specification within the same place were

flagged; these are usually rejected after fraud and error detection is performed. Figure below provides actual examples of duplicate data fraud.



**c. Duplicate Images / Online Images:** Occasionally contributors attempt to submit the same image multiple times as different observations, or take a picture of the requested item from a website or other online source. In either case, the images can be detected via relatively straightforward image analysis.

**d. Traveling Gnome Fraud:** A contributor attempts to submit observations of the same product multiple times, either by carrying the product to multiple locations or by carrying a picture of the product to multiple locations. Pattern detection and trend analyses can identify these attempts and flag for manual review.

### Manual Quality Control

All observation are either accepted, rejected, or flagged manual review by the automated fraud and error detection algorithms. The observations that are flagged for manual review are then placed in a queue and distributed to Premise's manual quality control team.

Premise has developed a tool, Scope, to simplify the manual quality control process. Scope allows quality control workers to quickly review large batches of observations and mark individual observations as accepted or rejected. Scope is designed to not only present individual observations to quality control workers, but also to present detailed descriptions of the tasks. This ensures that for each task quality control workers have a detailed. It also provides mechanisms for quality control workers to provide feedback to contributors about why their observations are being rejected.

Once the packaging and location of any given product is known, it is reasonable to expect that prices for said product will fall within a definable range. As such, the selection of the appropriate outlier detection

method is a function of the observed distribution of the data. All the methods applied by Premise attempt to minimize assumptions of normality and unimodality while retaining the natural price variance of the products. In practice, prices are seldom normally distributed and often exhibit multiple modalities.

Even the most well-intentioned and careful contributor makes mistakes when capturing data. The primary cause of these errors are the result of erroneous input. For instance, a misplaced decimal point or erroneous currency when recording the price of an item can result in spurious observations that are orders of magnitude away from the median. For this reason, Premise's outlier detection methods need to be robust to very large outliers.

The simplest outlier detection methodology used by Premise is to eliminate prices that fall outside of an expected range. The steps taken are as follows:

1. Apply a natural logarithmic transform to normalized prices for a given product
2. Calculate interquartile ranges (IQRs)
3. Determine if a data point is less than 1.5 IQRs below the first quartile or 1.5 IQRs above the third quartile, eliminate the data point

## Key Lessons Learned

During the first phase of the pilot significant progress was made in understanding how to better leverage the Premise platform in achieving the objectives of the study.

The key challenge to applying the Premise platform to augment the availability of comparable price data was ensuring that contributors understood which items were needed, and then accurately capturing them. In order to ensure both intra- and inter-country price comparability. This challenge resulted in variability of reported prices during the first phase of the pilot, especially for service items. Based on learnings, a number of modifications has been made to the Android application and survey flow to better convey the essence of the ICP item descriptions to contributors, and respectively enhance the quality of the collected data. These specifications and contextualization work will continue during the second phase of the pilot as additional lessons are learned.

The second challenge was selecting a survey frame that was representative, and ensuring a consistent number of observations in each selected city for each item. Between 16 and 30 locations were selected within each of the three countries in the first phase of the pilot. The selection of these areas was ad-hoc, with a focus on ensuring both urban and rural areas were represented, resulting in potentially sub-optimal survey frames. The selection process is more systematic in the second phase of pilot, and focuses on representativeness in multiple dimensions. Lastly, in the first phase of the pilot, ensuring a consistent number of observations in each area for each item on a monthly basis was not a priority. As a result, the number of observations varied from month to month. In the second phase of the pilot, ensuring that there are sufficient observations for each item at each survey location every month will be a priority.

The third challenge was the difficulty to collect information on venue, or outlet, types from contributors. As part of the metadata collected for each price observation, contributors were asked to classify the

venues where they captured price data using the ICP venue type categories. However, the nuances of the ICP venue type classification system were not easily conveyed via the mobile application, and as a result the outlet type information for the first phase of pilot contains a number of anomalies. Changes have since been introduced to the Premise application to facilitate the process of collecting venue type information, and further refinements will likely be necessary.

## Main Adjustments

As noted above, there were three key challenges during the pilot phase of this program. The first was ensuring that contributors understood which items were needed, and then accurately captured those items. The second was selecting a set of regions within each country that were sufficiently representative, and ensuring the consistent collection of prices on a monthly basis for each item. The third was the collection of venue type information, as contributors seemed confused by the venue type classification system.

## Conveying Item Specifications to Contributors

The key challenge identified during the first phase of the pilot was ensuring that contributors had a detailed understanding of which items to price. A core principle of the ICP program is the comparison of similar products across countries, requiring that the item definitions are precise, including all major price determining factors. This specificity introduced challenges when working with untrained enumerators.

The key lessons learned are:

1. Item definitions need to be precise, short, simple, and highlight a few key features of the item under consideration;
2. Item definitions need to be presented and written in a consistent manner, enabling users to quickly identify salient points;
3. Item definitions should be localized to the extent possible;
4. User understanding of item definitions should be verified through a set of follow-up questions;
5. Item definitions should not require any subjective judgment on the part of contributors.

Additional survey workflow modifications are further discussed below under the “Changes to the user interface” section.

## Survey Frame Selection and Collection Consistency

The second challenge was selecting a survey frame that was representative and ensured a consistent number of observations in each selected city for each item. Between 16 and 30 locations were selected in each of the three countries in the initial pilot. The locations were selected to:

1. Ensure that the large urban areas of each country were included;
2. Ensure that selection of rural areas were included; and
3. Ensure that locations were selected from across the breadth and width of each country.

In the pilot’s second phase, the criteria for location selection were expanded and more emphasis was placed on identifying a representative mix of locations in terms of population density and income levels, the latter ensuring that areas of high poverty are also sampled. This will enable the data collected to support the estimation of various poverty metrics.

Finally, in the first phase of the pilot, ensuring a consistent number of observations in each area for each item on a monthly basis was not a priority. Rather, the focus was on securing enough data to estimate quarterly PPPs. While the goal to estimate quarterly PPPs remains the same in the second phase of the pilot, there will also be a focus on gathering a sufficient number of observations from each city every month. This will enable to account for any drastic intra-quarter shifts in terms of survey coverage, as well as provide a useful mechanism for checking data quality.

### Conveying the Venue Type Classification to Contributors

Contributors seemed to find the venue type classification scheme utilized by the ICP to be difficult to comprehend and apply in the field, as the distinctions between certain types of venues require subjective judgement. For example, users were asked to distinguish between “large shops”, “medium shops”, and “small shops”, which requires a level of subjective judgment. To improve the quality of this data, an alternative venue type classification scheme will be introduced, the user interface will be modified, and contributors will not be asked to provide venue type information for those items which by definition can only be collected at one venue type.

### Changes to the User Interface

In response to the lessons learned during the pilot, a number of changes have been made to the contributor user interface and the item definitions presented to contributors:

1. Key elements of the item criteria are now listed earlier in the data collection workflow. Key exclusion criteria are now presented on the list of tasks available to the user. This helps set user expectations before they have invested any time into their assigned tasks;
2. Item definitions are now presented in a clearer ‘interstitial’ page. The format of the product criteria has been simplified and standardized across all items;
3. Item definitions presented to contributors have also been simplified and standardized. During the first phase of the pilot, the ICP item definitions were presented to contributors verbatim. In the second phase, they have been modified to improve readability and highlight key points of product differentiation;
4. Item definitions are now localized to reflect country specific factors. For example, cars are often branded differently in different countries;
5. A set of ‘verification’ questions has been added to each collection task to help determine if contributors understand the product definitions, as well as to further automate the removal of errant observations from the data. During the first phase of the pilot, the survey instrument was kept relatively simple by asking primarily for the price and quantity of each item under study. In the second phase, the instrument has been expanded and a set of structured questions have been added for each item that ask contributors about the key features of that item.

## Annex: List of Pilot Items

Basic Heading name	Item code	Item name
Rice	110111101	Long-grain rice, parboiled, WKB
Rice	110111102	Long-grain rice, not parboiled, WKB
Rice	110111106	Broken rice, 25%, BNR
Other cereals, flour and other products	110111201	Cornflakes, KELLOGG'S
Other cereals, flour and other products	110111202	Wheat flour, not self-rising, BL
Other cereals, flour and other products	110111250	Cornflakes, excluding KELLOGG'S
Bread	110111303	Bread, whole wheat, WKB
Bread	110111305	Bread, white, sliced, WKB
Other bakery products	110111405	Butter biscuits, WKB
Other bakery products	110111407	Salted crackers, WKB
Pasta products	110111502	Spaghetti, WKB
Pasta products	110111504	Instant noodles, any flavor, WKB
Beef and veal	110112105	Beef, with bones
Beef and veal	110112106	Beef, minced
Pork	110112202	Pork, fillet
Pork	110112204	Pork, ribs
Lamb, mutton and goat	110112302	Lamb, chops
Lamb, mutton and goat	110112304	Goat, mixed cut, with bones
Poultry	110112401	Chicken, whole, fresh
Poultry	110112402	Chicken, whole, frozen
Poultry	110112404	Chicken legs
Other meats and meat preparations	110112501	Pork ham, pressed, WKB
Other meats and meat preparations	110112502	Bacon, smoked, WKB
Fresh, chilled or frozen fish and seafood	110113101	Carp
Fresh, chilled or frozen fish and seafood	110113102	Mackerel, un-cleaned
Fresh, chilled or frozen fish and seafood	110113106	Shrimps, peeled, frozen
Fresh, chilled or frozen fish and seafood	110113111	Tilapia
Preserved or processed fish and seafood	110113201	Sardines, tinned, with skin, in vegetable oil, WKB
Preserved or processed fish and seafood	110113202	Tuna flakes, tinned, WKB
Fresh milk	110114101	Milk, fresh, unskimmed, WKB
Preserved milk and other milk products	110114203	Yoghurt, plain, WKB
Cheese	110114303	Cheese, processed, WKB
Eggs and egg-based products	110114401	Chicken eggs, caged hen, large size
Butter and margarine	110115101	Butter, unsalted, WKB
Other edible oils and fats	110115301	Sunflower oil, BL
Other edible oils and fats	110115302	Olive oil, extra virgin, WKB
Other edible oils and fats	110115306	Vegetable oil, WKB
Fresh or chilled fruit	110116101	Fresh apple, red delicious
Fresh or chilled fruit	110116102	Fresh bananas, standard
Fresh or chilled fruit	110116105	Fresh oranges

Basic Heading name	Item code	Item name
Fresh or chilled fruit	110116111	Fresh apples, typical local variety
Frozen, preserved or processed fruit and fruit-based products	110116201	Tinned pineapple, whole slices, BL
Frozen, preserved or processed fruit and fruit-based products	110116203	Roasted groundnuts (peanuts), WKB
Fresh or chilled vegetables other than potatoes	110117101	Fresh cucumber
Fresh or chilled vegetables other than potatoes	110117103	Fresh carrots
Fresh or chilled vegetables other than potatoes	110117104	Fresh onions
Fresh or chilled potatoes	110117201	Fresh potatoes, brown
Frozen, preserved or processed vegetables and vegetable-based products	110117304	Potato chips (crisps), WKB
Frozen, preserved or processed vegetables and vegetable-based products	110117306	Tomato paste, small, WKB
Sugar	110118101	White sugar, WKB
Jams, marmalades and honey	110118201	Jam, strawberry or apricot, WKB
Jams, marmalades and honey	110118204	Honey, mixed blossoms, BL
Confectionery, chocolate and ice cream	110118301	Milk chocolate bar, WKB
Confectionery, chocolate and ice cream	110118305	Ice cream, 500-1000 ml, WKB
Food products nec	110119102	Cooking salt, WKB
Food products nec	110119103	Tomato ketchup, WKB
Coffee, tea and cocoa	110121102	Instant coffee, NESCAFE Classic
Coffee, tea and cocoa	110121105	Black tea, in bags, WKB
Coffee, tea and cocoa	110121107	Black tea, BL
Mineral waters, soft drinks, fruit and vegetable juices	110122101	Water, still, large bottle, WKB
Mineral waters, soft drinks, fruit and vegetable juices	110122102	COCA COLA / PEPSI COLA, can
Mineral waters, soft drinks, fruit and vegetable juices	110122104	Apple juice, WKB
Spirits	110211101	Vodka, WKB
Wine	110212101	Red wine, table wine, BL
Beer	110213102	Beer, domestic brand, single bottle, WKB
Tobacco	110221101	Cigarette, MALBORO Red
Tobacco	110221103	Cigarettes, domestic, blond, WKB
Clothing materials, other articles of clothing and clothing accessories	110311101	Clothing material, cotton, BNR
Garments	110312103	Men's shirt, WKB-M
Garments	110312104	Men's trousers, cotton/polyester, WKB-L
Garments	110312106	Men's T-shirt, WKB-L
Garments	110312107	Men's blue jeans, WKB-L
Cleaning, repair and hire of clothing	110314101	Dry cleaning, men's two-piece suit
Shoes and other footwear	110321101	Men's lace-up shoes, WKB-L
Shoes and other footwear	110321103	Men's sport shoes, ADIDAS, ASICS, NIKE

Basic Heading name	Item code	Item name
Shoes and other footwear	110321150	Men's sandals, (flip-flops)
Actual and imputed rentals for housing	110411102	Single-family house, 180-240 m2
Actual and imputed rentals for housing	110411109	Studio apartment, 35-60 m2
Actual and imputed rentals for housing	110411110	One-bedroom apartment, 40-60 m2
Actual and imputed rentals for housing	110411113	Two-bedroom apartment, 80-120 m2
Maintenance and repair of the dwelling	110431101	Paint, indoor use, washable, WKB
Maintenance and repair of the dwelling	110431103	Cement, Grey Portland, WKB
Water supply	110441101	Water supply, piped on premise, excluding sewerage
Water supply	110441102	Water supply, piped on premise, including sewerage
Electricity	110451101	Electricity: 600 kWh
Gas	110452101	Liquefied gas, propane
Other fuels	110453101	Charcoal, sack
Other fuels	110453102	Kerosene
Furniture and furnishings	110511101	Kitchen table, BL
Furniture and furnishings	110511104	Chest of drawers, 3 drawers, WKB
Furniture and furnishings	110511108	Foam mattress, double, WKB
Carpets and other floor coverings	110512101	Rug, combination of wool and synthetic, BL
Carpets and other floor coverings	110512102	Rug, synthetic, BL
Household textiles	110521103	Bath towel, large, WKB
Household textiles	110521104	Flat bottom sheet, single, cotton, BL
Major household appliances whether electric or not	110531103	Microwave oven, 16-22 l, WKB-L
Major household appliances whether electric or not	110531105	Fridge-freezer, low, WKB-L
Major household appliances whether electric or not	110531111	Vacuum cleaner, WKB-M
Small electric household appliances	110532104	Steam iron, WKB-M
Small electric household appliances	110532106	Table fan, BL
Glassware, tableware and household utensils	110541101	Cooking pot, stainless steel, WKB-L
Glassware, tableware and household utensils	110541104	Dinner plate, flat, porcelain, WKB-L
Glassware, tableware and household utensils	110541105	Water glass, BL
Major tools and equipment	110551105	Electric drill, corded, impact, WKB-M
Small tools and miscellaneous accessories	110552103	Energy saving light bulb, 15W, WKB
Small tools and miscellaneous accessories	110552104	AA alkaline batteries, DURACELL
Non-durable household goods	110561101	Laundry detergent powder, washing machine, WKB
Non-durable household goods	110561102	Laundry detergent powder, hand wash, WKB
Non-durable household goods	110561108	Dishwashing detergent, WKB
Non-durable household goods	110561109	Household candles, box, BL
Household services	110562201	Laundry
Pharmaceutical products	110611101	Acetaminophen/Paracetamol, 500 mg, Tablet/Capsule, Generic

Basic Heading name	Item code	Item name
Pharmaceutical products	110611135	Ibuprofen, 400 mg, Tablet/Capsule, Originator
Other medical products	110612103	Men's condoms, WKB
Other medical products	110612105	Plaster strips, plastic foil, WKB
Therapeutic appliances and equipment	110613101	Contact lenses, soft, monthly disposable, WKB
Medical Services	110621101	Consultation: general medical practitioner/primary care physician
Dental services	110622101	Dentist: extraction of a tooth, for adult
Paramedical services	110623105	Thorax X-ray photograph, for adult
Motor cars	110711104	Motor car, petrol engine, <1,200cc - Citroen
Motor cars	110711108	Motor car, petrol engine, 1,200-1,699cc - Toyota
Motor cars	110711110	Motor car, petrol engine, 1,200-1,699cc - Ford
Motor cars	110711113	Motor car, petrol engine, 1,700-2,999cc - Honda
Motor cars	110711114	Motor car, petrol engine, 1,700-2,999cc - Toyota
Motor cycles	110712101	Motorcycle, HONDA, Wave or equivalent
Motor cycles	110712102	Motorcycle, HONDA, CBR125R
Motor cycles	110712104	Scooter, 50cc, WKB
Bicycles	110713104	Hybrid bicycle, WKB
Bicycles	110713105	Bicycle, basic commuter, WKB
Fuels and lubricants for personal transport equipment	110722101	Petrol
Fuels and lubricants for personal transport equipment	110722102	Petrol, Super
Fuels and lubricants for personal transport equipment	110722103	Petrol, Superplus
Fuels and lubricants for personal transport equipment	110722104	Diesel fuel, normal
Maintenance and repair of personal transport equipment	110723103	Summer tire, R15, WKB
Maintenance and repair of personal transport equipment	110723105	Car battery, 55 Ah, WKB
Other services in respect of personal transport equipment	110724102	Car hire, 1 day, unlimited mileage, WKB
Passenger transport by railway	110731101	Interurban transport, single ticket, 50 km
Passenger transport by railway	110731104	Urban tram (rail) or tube, single ticket
Passenger transport by road	110732101	Urban (city) bus, 5-15 km
Passenger transport by road	110732103	Interurban (InterCity) bus, 50 Km
Passenger transport by air	110733106	Flight, international, return ticket, long distance
Passenger transport by air	110733107	Flight, domestic, return ticket
Postal services	110811101	Postage of a letter, domestic
Telephone and telefax equipment	110821105	Mobile phone, SAMSUNG Galaxy 6
Telephone and telefax equipment	110821106	Samsung Galaxy J5
Telephone and telefax services	110831150	Prepaid contract without data
Telephone and telefax services	110831151	Prepaid contract phone with data
Audio-visual, photographic and information processing equipment	110911105	Television, LED, 43", LG

Basic Heading name	Item code	Item name
Audio-visual, photographic and information processing equipment	110911112	Laptop computer, LENOVO Ideapad U series
Recording media	110914150	Micro-SDHC memory card, 32 GB, WKB
Other recreational items and equipment	110931110	Football (soccer ball), WKB
Garden and pets	110933103	Cat food, tin, WKB
Cultural services	110942103	Cinema ticket, weekend
Newspapers, books and stationery	110951105	National daily newspaper, WKB
Education	111011101	Primary Education
Education	111011105	Tertiary Education (Economics Degree)
Catering services	111111105	Pizza marguerite, at restaurant
Catering services	111111107	Sweet and sour chicken, at restaurant
Catering services	111111121	Coca cola or Pepsi, at caf or restaurant
Accommodation services	111121103	Hotel, three-star, capital city
Accommodation services	111121105	Bed and breakfast, two-star, capital city
Hairdressing salons and personal grooming establishments	111211101	Men's haircut, barber shop
Hairdressing salons and personal grooming establishments	111211104	Women's haircut, basic hairdresser
Appliances, articles and products for personal care	111212104	Toothpaste, tube, COLGATE
Appliances, articles and products for personal care	111212109	Bar soap, solid, SB
Appliances, articles and products for personal care	111212111	Toilet paper, multipack, WKB
Jewelry, clocks and watches	111231102	Wrist-watch, men's, CITIZEN Eco-Drive BM6060
Jewelry, clocks and watches	111231104	Wedding ring, 14 Karat gold, WKB
Other personal effects	111232104	Trolley, soft case, BL