

مركز الإحصاء
STATISTICS CENTRE



Industrial Production Index

Methodology

2024

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1. 1. Overview

1.1. Introduction

The Statistics Centre of Abu Dhabi (SCAD) is the official authority responsible for calculating and issuing the Industrial Production Index (IPI) in the Emirate of Abu Dhabi, which is issued periodically every quarter. The IPI is a statistical economic index that measures the change in industrial production volumes (manufacturing industries) over time.

The IPI serves a variety of goals and is used by policymakers, businesses, and national account compilers, and is key building block in SCAD's system of important economic indices for prices, production, and other areas.

Nevertheless, SCAD is currently undertaking a major review of its approach to ensure the IPI is consistent with latest international best practices, including a planned change from quarterly to monthly dissemination frequency.

1.2. Concepts and definitions

A volume index is a statistical tool that allows the comparison of the volumes of a common set of products or product groups over time. The IPI measures the change in industrial production volumes (manufacturing industries) between adjacent periods. The compilation of the Abu Dhabi IPI is based on the same dataset as the Industrial Producer Price Index (IPPI) and therefore follows, where possible, the same key concepts and definitions outlined for economic indices in Producer price index manual, theory and practice published jointly by the ILO, IMF and other international organizations.

1.3. Abu Dhabi special considerations

It should be noted that Abu Dhabi is an emirate and one of 7 emirates in UAE, therefore certain limitations apply in collecting and obtaining data. The IPI however is based on a survey tailored to the emirate of Abu Dhabi and administrative data are available specifically for the Abu Dhabi region, therefore the IPI compilation can be considered as accurate as otherwise for a national entity and is not subject to particular constraints.

1.4. Classifications and standards applied

SCAD aligns its data collection and processing, where possible (and relevant to volume indices), with ILO standards described in Producer price index manual, theory and practice. The Abu Dhabi IPI adheres to the International Standard Industrial Classification of All Economic Activities (ISIC4), the latest revision of the internationally used industrial classification. This ensures consistency and comparability with other countries' IPI indices.

1.5. Available breakdown

SCAD currently only publishes the IPI for the manufacturing categories of ISIC4, but work is ongoing to expand this to other industries to better align with international best practices for the IPI. SCAD makes

the 2-digit ISIC4 breakdown for selected manufacturing sectors available to all users. The following 24 industries are covered by the Abu Dhabi PPI:

- 09 Mining Support Services Activities
- 10 Manufacture of food products
- 11 Manufacture of beverages
- 13 Manufacture of textiles
- 14 Manufacture of apparel
- 15 Manufacture of leather and other related products
- 16 Manufacture of wood, wood products, and cork, except for furniture; manufacture of items from straw and plaiting materials
- 17 Manufacture of paper and paper products
- 18 Printing and reproduction of recorded media
- 19 Manufacture of coke and refined petroleum products
- 20 Manufacture of chemicals and chemical products
- 21 Manufacture of pharmaceuticals, chemical, and botanical pharmaceutical products
- 22 Manufacture of rubber tires and tubes as well as renewing and rebuilding the external surfaces of rubber tires
- 23 Manufacture of other non-metallic minerals products
- 24 Manufacture of base metals
- 25 Manufacture of formed metal products, except machinery and equipment
- 26 Manufacture of computers and electronic and optical products
- 27 Manufacture of electrical equipment
- 28 Manufacture of machinery and equipment unclassified elsewhere
- 29 Manufacture of motor vehicles, trailers, and semi-trailers
- 30 Manufacture of other transportation equipment
- 31 Manufacture of furniture
- 32 Other manufacturing industries
- 33 Repair and installation of machinery and equipment

1.6. Importance and objectives of the indicator

The IPI provides quarterly estimates of the rates of change in the production volume for manufacturing industries.

The main objectives of the IPI are the following:

- Providing the necessary data to help decision-and policy-makers and researchers to plan and make decisions that support the industrial sector.
- Providing the necessary data for processing and drafting economic policies and plans.
- Providing the data required to process the time series of economic data.

Main uses of the IPI include:

- Determining the trends of the IPI within the Emirate of Abu Dhabi to assist decision-makers, policy-makers, and researchers in planning and making decisions that support the industrial sector.
- Monitor the emergency escalation in sales and purchase contracts.
- Feeding analysis by international economic organizations, such as the IMF, where it is used as an evaluation and comparison tool.

2. Indicator information

2.1. Geographical coverage

The IPI covers all activities of the manufacturing sector in the Emirate of Abu Dhabi. It represents all manufacturing activities at the 2-digit level according to ISIC4. A total of 24 industrial activities were selected to represent the manufacturing sector, where data are collected from 91 sources representing these activities across the Emirate of Abu Dhabi.

2.2. Statistical population

The Abu Dhabi IPI reflects production volumes by businesses that are based in the three geographical divisions of Abu Dhabi.

2.3. Periodicity

The Industrial IPI report is issued on a quarterly basis, however given the importance of the IPI and to better align with ILO recommendations and global best practices, SCAD is currently working on increasing the publication frequency to monthly.

2.4. Timeliness

The IPI is issued during the following quarter after 45 days from the end of the reference quarter.

2.5. Units

The IPI is an index that equals 100 in its base year (currently 2021).

2.6. Reference period

Quantity reference period: The reference period for quantity data collection is each calendar quarter, however as stated in the periodicity section, this is due to change to each calendar month.

Index reference period: Overall, the reference period for comparing quantity changes is the base year (currently 2021).

Weight reference period: The weights are based on the latest business survey conducted in 2019. SCAD is currently working on updating index and weight reference periods to from 2019 to 2024.

3. Methodology

3.1. Alignment to international standards

The compilation of the IPI is based on the same dataset as the IPPI which broadly follows, where possible, the recommendations outlined in Producer price index manual, theory and practice published jointly by the ILO, IMF and other international organizations. This means that procedures for data collection and validation, data imputation and indexation can be reconciled with the methodology outlined therein and is broadly consistent with other national statistics offices' best practices.

3.2. Data sources

SCAD relies on survey data for the IPI.

3.2.1 Survey data

The main source of data is a field survey conducted by SCAD's Price and Income Statistics Section, which collects the Quantities of 390 products from 91 establishments representing economic activity at the second digit ISIC4 level. The sample distribution covers 76 establishments in the Abu Dhabi region and 15 establishments in the Al Ain region.

3.2.1.1 Collection method

SCAD designed a questionnaire to specifically collect prices and quantities of industrial production based on the data required for the compilation of both the IPI and the Industrial Production Index (IPI). The form including the questionnaire is sent to selected establishments on a monthly basis.

Quantity and price data are collected through field visits or by e-mail communication following prior coordination with the establishment and explanation of the form by trained enumerators.

3.2.1.2 Sample design

The survey uses the probability proportional to size (PPS) sampling method in which a size measure is available for each establishment unit before sampling and where the probability of selecting a unit is proportional to its size.

In the case of the IPI, the size of the establishment is usually determined by its revenue, therefore businesses with higher revenues are more likely to be sampled. Overall, establishments were drawn for the 2019 version of the IPI.

Establishments from the Economic Surveys of 2019 were approved for use in the calculation of weights for the IPI according to the classification ISIC4, and 390 products that represent economic activities were identified to form the IPI basket.

The sample of establishments is distributed as follows

- Abu Dhabi: 76 establishments
- Al Ain: 15 establishments

3.2.2 Administrative data

The Abu Dhabi IPI is full based on survey data. No administrative data has been used in the compilation of the IPI.

3.3. Data validation and editing

3.3.1 Data validation

The data validation process begins with data entry verification. In addition, the quantities collected in the current month are compared to the quantities collected in the previous month at this stage to avoid entry errors and errors in collecting the quantities of products that do not meet the required specifications.

The validation stages at the SCAD office can be summarized as follows:

1. Following up and daily discussion of the enumerator before he goes to the field to collect data.
2. The quantities collected by the enumerators in the field and the data sent by e-mail are tracked and monitored before being entered and then compared to the previous months. If any unjustified difference in the quantities is observed, whether in the increase or decrease, they shall be returned to the source, whether in the field or by e-mail, to avoid any errors.
3. Automated editing rules for quantities changes have been set that displays the good/service whose quantity exceed the predefined limit of percentage change. The limits set are based on data from previous years of the establishments.

3.3.2 Missing data adjustments

Production quantity and value data are used to impute missing price observations for the IPPI. In the case of the IPI, missing observations point to out-of-season products which may require additional treatment, especially in the case of temporary or permanent unavailability.

- Temporary unavailability: when the quantity is non-zero but the exact value is not available from a specific source during the monthly or quarterly collection process, the quantity is imputed based on other establishments in the same industry and based on the sector expert at SCAD as well as market knowledge.
- Permanent unavailability of establishment or product: In the event of closure of the establishment, or discontinuation of production of certain items, depending on the reasons (e.g. internal or external reasons) the closed establishment is either replaced by an alternative establishment from the same ISIC4 industry, or the quantities collected from the closed establishment are set to zero (only if the reason is local or foreign competition).

3.4. Data processing

The IPI is compiled from the validated survey data, with no other data sources used. SCAD applies weights to each ISIC4 manufacturing industry (as well as corresponding sub-groups and products), reflecting their relative importance versus other industries and product, and compares the outcome to the historical IPI series (including the reference year data) to construct the index and relevant growth rates.

3.4.1. Linking different datasets

Linking different datasets is not applicable to this publication.

3.4.2. Sample weighting

The IPI basket weights are important variables in the index calculation process. The index weights are based on the results of an economic survey implemented by the Industry and Business Statistics unit at SCAD, using a sample representative of the Emirate of Abu Dhabi. The following main points were considered during the weight calculation process:

- The weight of the economic activity according to the second level of ISIC4 is based on the total revenues per industry relative to the total revenue across all industries.
- Following the first visit to the sample establishments and determination of the main important goods and services produced within each establishment, the establishment's weight was distributed over its main commodities based on the production value of each good/ service.
- The following equation was used to calculate the weight based on revenue: Establishment's Weight = Establishment's total revenues / Grand total of revenues for all establishments * 100
- Weights are updated whenever the necessary data are available. SCAD has last updated its IPI index weights in 2019 in line with the base year, however SCAD seeks to increase the update frequency to 2-5 years, as per ILO recommendations and international best practices.

3.4.3. Statistical calculation method

The index calculation follows the initial data editing and processing, which includes the following steps:

- data classification and coding process
- application of editing and validation rules
- approval of raw data
- imputation of missing values

Once the data is approved for statistical processing, indices

The quarterly production index is obtained by calculating the average of the product quantities during the three months. Then the quantity relative is calculated at the product level within each establishment.

The IPI is calculated according to the Laspeyres formula:

$$IPI_L = \sum \frac{Q_{1i}}{Q_{0i}} \times W_{0i}$$

IPI = Industrial Production Index

Q₁ = Current quantity

Q₀ = Base year quantity

W₀ = Weight for the base year

Finally, the growth rates (or relative change in IPI) is calculated by comparing the reference quarter with the previous quarter, according to the following equation:

$$RC = \frac{IPI_c}{IPI_p} \times 100 - 100$$

RC = Quarterly or annual rate of change

IPI_c = Index for the current quarter

IPI_p = Index for the previous quarter / the same quarter of the previous year

3.4.4. Seasonal adjustment

SCAD does not currently disseminate a seasonally adjusted IPI index.

3.4.5. Chain linking

SCAD does not currently produce a chain linked IPI.

4. Special cases

Industrial Production Index (IPI) statistic do not present special cases of indicators.

5. Outputs and quality

5.1 Dissemination and accessibility

Data for the IPI are published in excel and pdf format on the SCAD website. The pdf document highlights some key points with regard to the latest data and contains a chart of overall IPI performance over the recent past. The excel file contains the full dataset for ISIC4 2-digit manufacturing industries for the reference period and a comparison to the previous year.

A brief methodology overview is included in each pdf publication. SCAD is also currently rolling out a metadata table for each indicator including key information on various indicator dimensions.

5.2. Length of available dataset

The IPI dataset consists of a time series at the 2-digit ISIC4 detail for selected manufacturing industries, starting in 2012.

5.3. Methodology changes

No changes have been made to the Abu Dhabi IPPI since its inception in 2012. A methodological reviewed in 2022, which updated the index and weight reference years to 2019 and the base year to 2021.

5.4. Data coherence and comparability

The first version of the Abu Dhabi IPI was released in 2012.

Following the 2022 methodological review, the new version of the IPI is linked to the old version to form a continuous time series with consistent growth rates.

When comparing the Abu Dhabi IPI to other countries' or regions' volume indices, users should be aware of potential differences in concepts as well as differences in compilation methods. In general, SCAD follows internationally recommended classification and indexation methodologies to facilitate cross-country comparisons. One key difference is the industry coverage – Abu Dhabi only publishes an IPI for manufacturing industries but no whole-economy PPI like most countries (i.e. based on a full set of ISIC4 industries including services). SCAD is working on expanding its industry coverage to obtain a more broad-based IPI in line with other countries.

5.5. Data accuracy and potential sources of errors

Data accuracy describes how closely the statistical indicator resembles the true value of the concept it measures; in this case the production quantity changes in the Abu Dhabi economy. It is important to recognize that some items in the IPI basket are more important than others. Therefore, SCAD makes use of the business survey to derive relative weights that determine how certain products impact the overall IPI. The business survey is periodically used to update IPI weights, to ensure the relative importance in the IPI calculation remain relevant and reflective of real-world developments.

A number of sampling and non-sampling errors can arise along the design, collection, and calculation stages. SCAD takes several measures to mitigate errors as follows:

- **Sampling:** SCAD is planning to increase its sample size to be more representative of the emirate of Abu Dhabi. While a certain degree of sampling error cannot be avoided when taking a sample of observations as opposed to recording all quantities or all items in Abu Dhabi, raising the sample size can mitigate the bias substantially.
- **Data collection:** SCAD tries to minimize collection errors by periodically following up with establishments to ensure clarity on filling out the questionnaires. Well-trained enumerators and statisticians follow a strict validation procedure that requires passing several data checks before the data is submitted for data processing by the statistical office.
- **Data processing:** SCAD is continuously aligning the methodology with international standards and best practices, but certain scope for errors remains as it is difficult to perfectly account for quality changes in certain product groups, and available index formulas may slightly over or understate the true amount of quantity changes.

Accuracy tends to increase at higher levels of geographic and product aggregation due to the larger sample sizes of price data. Moreover, any distortions that can arise at elementary product indices (e.g. during price/quantity collection and editing, or in making quality adjustments) are more likely to cancel out on the aggregate level.

5.6. Revision policy

As per global standards, the original, non-seasonally adjusted IPI series are revised only in special circumstances, such as correction of significant errors. However, the index reference/base period (i.e. the period in which the index equals 100) is changed periodically, resulting in a fully revised time series.

Seasonally adjusted indexes, which may be added to the new monthly IPI in the future, may be revised as extra months/quarters are included in the series that provide additional information on seasonal patterns.

5.7. Limitations of dataset

The industrial IPI expresses quantity changes of a large number of commodities in a single index number, and the composite quantity movement of the index is dependent on its approach, in this case the fixed quantities of the IPI basket that are proportional to the revenues of manufacturing establishments in Abu Dhabi. Consequently, considerations about the quality of the IPI relate to the chosen concepts of IPI compilation.

The IPI focuses on tracking aggregate production quantity developments and does therefore not accurately reflect quantity changes by different types of businesses, or by businesses that sell products in Abu Dhabi but are located elsewhere. It also exclusively focuses on manufacturing industries and cannot be used to draw conclusions about producer prices in other economic sectors.

Finally, the IPI uses fixed weights based on base year quantities and therefore may omit some of the changes that have taken place in the production process since then, such as changing importance of the recorded products or new emerging services and materials.

6. Institutional environment

Statistics Centre – Abu Dhabi (SCAD), as the competent government entity in charge of organizing statistical activities in the emirate, plays a pivotal role in supporting decision-makers, and policymakers in Abu Dhabi. The statistical activities in the emirate are organized by SCAD, with its strategic partners in the Statistical System of Abu Dhabi. The Law entrusts SCAD with the task of developing and organizing statistical in Abu Dhabi Emirate.

7. Glossary

Industrial production index:

A statistical tool for measuring the relative change in the prices of the basket of goods and services of industrial producers.

Source:

Is a productive economic establishment from which the prices of goods/ services of the IPI basket are collected.

Base Period:

The year in which the IPI equals 100. The base period serves as a benchmark for future periods, allowing economists to judge rates of increase and decrease in quantities compared to that year.

Comparison Period:

The "current" or most recent period for which the index was calculated. However, the term is used to refer to any period that is being compared to the base period.

Base period quantities:

The quantities of goods and services in the period designated as the base period, with which current quantities are compared.

Laspeyres Equation:

A mathematical equation developed by statistician Laspeyres to calculate economic index numbers.





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