Korea Fiscal Information Service

# Introduction of
# Fiscal Data System

June, 2024

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Introduction of Fiscal Data System

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Korea Fiscal Information Service

# Overview of Fiscal Data System

# 1. Overview of Fiscal Data System

## To support data-driven decision making

### Fiscal Data System

KOrea Fiscal Information Service

**KOFIS**

Fiscal Information Service

KOrea Risk Assessment and Horizon Scanning

**KORAHS**

Policy State Management System

KOrea Data Analysis System

**KODAS**

Data Analysis Service

**Step 01**

**Provide consolidated information on public finance**

- Provide data useful or applicable to fiscal affairs
- Diversify data sources according to the nature of the affairs

**Step 02**

**Diagnose and forecast policy states in real time**

- Implement AI and big data-driven policy state management
- Provide dashboards of key fiscal issues (employment, etc.)

**Step 03**

**Fuse and analyze cross-government data**

- Offer infrastructure for data application and analysis
- Facilitate data (fiscal and private-sector) fusion/convergence and subsequent analysis

Korea Fiscal Information Service

# Description of Fiscal Data System

# 1-1. Fiscal Information Service (KOFIS) – Provide consolidated information on public finance

KOFIS enables users to easily understand public financial information, such as budgets and accounts, and use this information to formulate fiscal policies.

"Laying the foundation for using fiscal data"

## KOFIS (KOrea Fiscal Information Service)

Provides data analysis functions and a variety of features to improve work efficiency

| 1 Consolidated or combined financial data | 2 Data visualization and multidimensional analysis | 3 Data integration by subject area |
|---|---|---|
| **Present statistical data on public finance and state property at a glance** | **Deliver time series data in a variety of visualization formats** | **Integrate data around the subjects of user interest** |
| **Previous years' budget and account settlement data** | **Provide multi-dimensional analyses by allowing users to organize their search information** | **Provide integrated management of commonly used indicators** |

dBrain+ System

# 1-2. KOFIS - Operational Framework

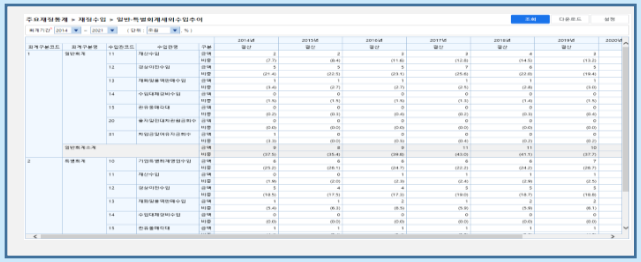
Provide a data analysis environment that allows users to extract and aggregate data generated by dBrain+ and perform statistical analysis according to the characteristics and purpose of their analysis

Collection | Analysis | Use

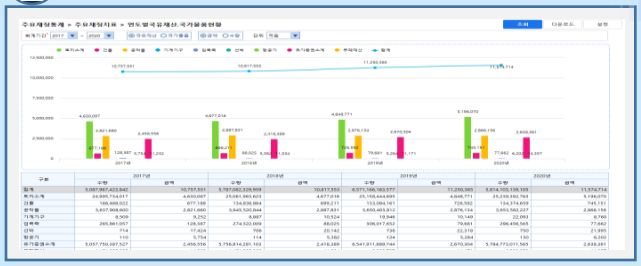
DATA

- Central government finance
- Local government finance
- Local education finance

## 1 Formatted statistical table- general

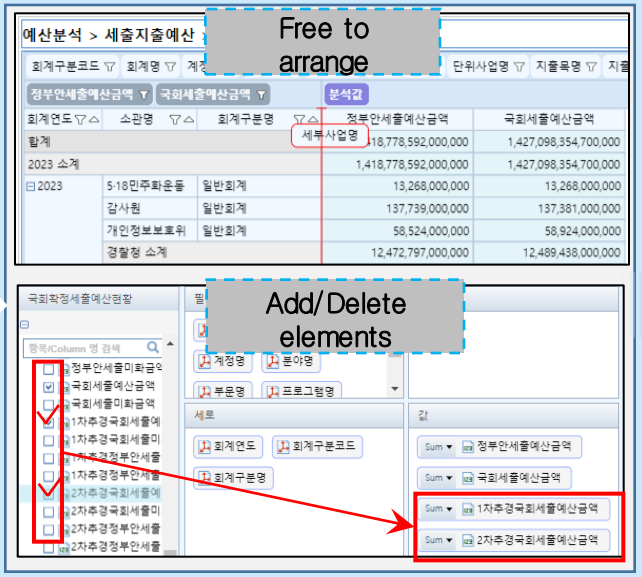


## 2 Formatted statistical table – chart



Available in charts and grids

## 3 Customizable statistical table




Users can add/delete search items or freely reorder search items

## Use in fiscal affairs

Review statistics per financial task

Use for statistical data visualization

Provide an environment for diverse use of fiscal statistics

# 2-1. Policy State Management (KORAHS) : Data-driven policy state management

Get linked to data in real time to identify future risks and opportunities in advance, support data-driven policy decisions, and take pre-emptive actions

## Implement data-driven policy state management system

KORAHS (KOrea Risk Assessment and Horizon Scanning)

Country-level Risk Assessment and Horizon Scanning

| 1 Data-driven monitoring of policy indicators | 2 Real-time management of policy state of key indicators | 3 Diagnosis and forecast of policy indicators |
|---|---|---|
| Get linked in real time to over 8,000 economic and social indicators whose thresholds are set | Manage demographic structure and change | AI-powered GDP forecasting |
| Real-time monitoring & Crisis detection | Manage the job market and local livelihoods | AI-assisted tax revenue estimates |
| Visualize key indicators | Manage external volatility | AI-assisted treasury balance forecasting |

dBrain+ System

# 2-2. Policy State Management (KORAHS) - Operational Framework

Collect data on fiscal, economic, and overall policy conditions and support scientific policy decisions through real-time monitoring and AI-driven forecasting

Collection | Navigation and Analysis | Use

DATA

- Central Government finance
- Local Government Finance
- Local Education Finance
- Administrative Data
- Economic Indicators
- Private Sector Data

1 Monitoring data-driven policy indicators

Early Warning

- Normal
- Signal
- Risk

2 Real-time management of policy state of key indicators

- Demographics
- Jobs
- Livelihoods
- External volatility

Descriptive
(Dragonfly's eye)
Real-time situational awareness and issue detection

3 Policy state diagnosis and forecasting

AI-powered forecasting models (digital twins for finance and economy)

- GDP forecast
- Fiscal estimation
- Analyzing the impact of fiscal investment

Simulation

Predictive
(Fish's lateral line)
AI-powered quantitative forecasting and simulation

Policy decisions

- Optimal budget allocation
- Pre-emptive crisis response

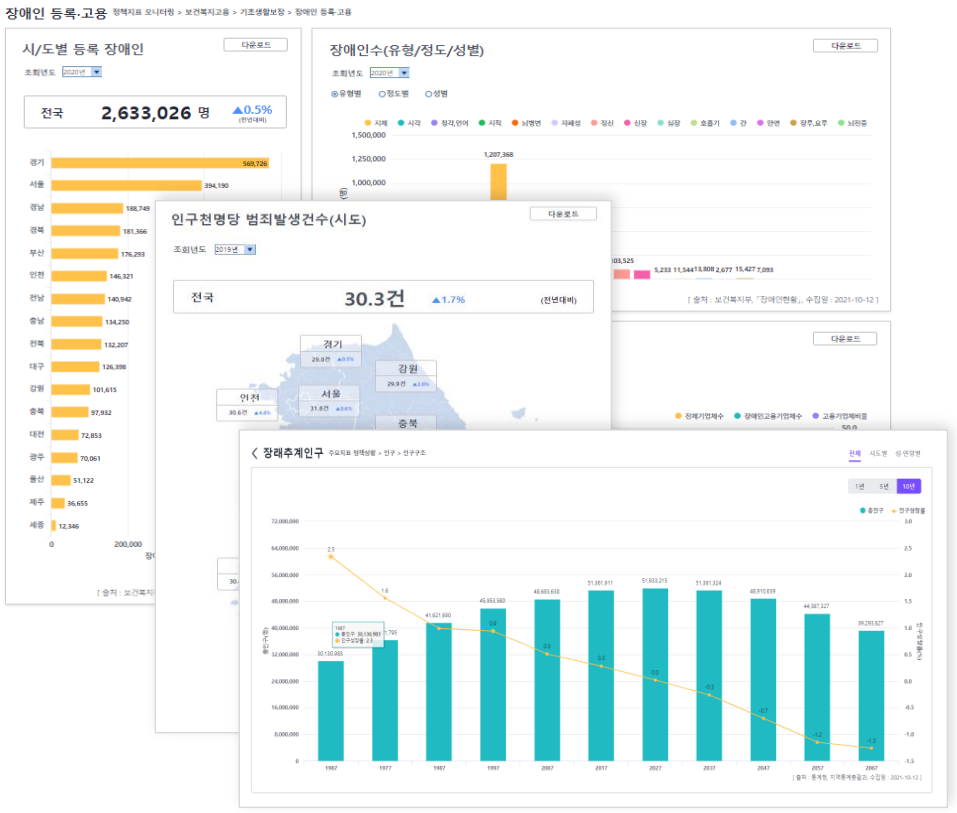
Prescriptive
(Eagle's eye)
Policy and strategy formulation

# 2-3. Phase1 Monitoring of Data-Driven Policy Indicators

Monitor policy state by linking to real-time economic and social indicators and fiscal data for the entire country, visualize the monitoring results, and set thresholds* for changes in indicator values to establish an early warning system

* Threshold: Baseline for pre-detecting signs of crisis

Example Providing visualized policy indicators




## Policy indicators subject to monitoring

✔Link to over 8,000 indicators in 71 groups of 14 divisions in real time

- Macro-economic and social indicators, fundamental fiscal statistics, regional statistics
- dBrain financial information (2,475) + external indicators (5,604)
- Thresholds set for 5,442 out of 8,079 indicators

dBrain internal indicators (2,475)

\+

External indicators (5,604)

| | | | |
|---|---|---|---|
| R&D, Defense, Foreign affairs, Reunification(127) | SOC (224) | Public order, Safety (266) | Education (158) |
| Agriculture, Forestry, Fisheries, & Food (178) | Culture, Sports, and Tourism (152) | Health, Welfare, and Employment (1,840) | Industry, SMEs, Energy (556) |
| General/local administration (1,314) | Public finance (148) | Local government finance (189) | Environment (452) |

※ Threshold visualization has been applied for over 1,200 indicators now and will be expanded to 8,000 in the future

# 2-4. Indicator Threshold Monitoring – Automatic Early Warning(EW)

An early warning is automatically issued when indicators change outside of the normal range, allowing early detection of crisis signs

Thresholds for policy indicators

Download Help

Threshold query My threshold indicator **Threshold status**

주기 : 연간 분기 월간 일간 임계상태 : 정상 단기관심 단기주의 장기관심 장기주의

분야 : 전체 부문 : 전체 지표그룹 : 전체

지표 : 세부지표 : 생성주기 : 검색기간 : 2022 ~ 2022 조회 나의임계지표관리

주의 관심 정상

| | 기준일 | 분야 | 부문 | 지표그룹 | 지표 | 차원1 | 차원2 | 차원3 | 지표값 | 전년대비증가율 | | 단기임계치 | | | | 장기임계치 | | | | 단기상태 | | 장기상태 | | 임계치이... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 관심 | | 주의 | | 관심 | | 주의 | | | | | | |
| | | | | | | | | | | 단기 | 장기 | 상방 | 하방 | 상방 | 하방 | 상방 | 하방 | 상방 | 하방 | 상방 | 하방 | 상방 | 하방 | 단기 |
| 1 | 2022 ... | 보건·복지·고용 | 사회복지일반 | 보건복지부 일반회계 ... | 보건복지예산 | ~ | ~ | ~ | 61.80 | 11.00 | 11.08 | 15.42 | 5.18 | 17.98 | 2.62 | 11.23 | 8.40 | 11.93 | 7.69 | | | | | 57.20 |
| 2 | 2022 ... | 보건·복지·고용 | 사회복지일반 | 보건복지부 일반회계 ... | 보건복지예... | ~ | ~ | ~ | 11.80 | -29.75 | 29.35 | 87.40 | -67.82 | 126.20 | -106.62 | 18.55 | -18.22 | 27.74 | -27.41 | | | | | 6.53 |
| 3 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 상승률 | 수혜 근로자... | ~ | ~ | ~ | 3,550.00 | -10.99 | 0.53 | 17.46 | -5.81 | 23.28 | -11.63 | 12.50 | 2.99 | 14.88 | 0.61 | | | | | 3,926.67 |
| 4 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 상승률 | 영향률 | ~ | ~ | ~ | 17.40 | -11.60 | -0.64 | 14.76 | -6.94 | 20.19 | -12.37 | 9.79 | 1.33 | 11.90 | -0.78 | | | | | 19.30 |
| 5 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 상승률 | 적용대상 근... | ~ | ~ | ~ | 20,446.00 | 0.73 | 1.41 | 2.64 | 1.03 | 3.04 | 0.63 | 2.55 | 1.70 | 2.77 | 1.48 | | | | | 20,350.00 |
| 6 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 상승률 | 전년대비 인... | ~ | ~ | ~ | 5.05 | -38.31 | -6.48 | 24.67 | -41.31 | 41.17 | -57.80 | 15.98 | -11.00 | 22.72 | -17.75 | | | | | 3.14 |
| 7 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 상승률 | 최저임금 상... | ~ | ~ | ~ | 5.05 | -38.31 | -6.48 | 24.67 | -41.31 | 41.17 | -57.80 | 15.98 | -11.00 | 22.72 | -17.75 | | | | | 3.14 |
| 8 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 일반현황 | 수혜 근로자... | ~ | ~ | ~ | 3,550.00 | -10.99 | 0.53 | 17.46 | -5.81 | 23.28 | -11.63 | 12.50 | 2.99 | 14.88 | 0.61 | | | | | 3,926.67 |
| 9 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 일반현황 | 시간급 최저... | ~ | ~ | ~ | 9,160.00 | 3.16 | 6.85 | 11.25 | 4.54 | 12.93 | 2.86 | 9.31 | 6.92 | 9.91 | 6.32 | | | | | 8,823.33 |
| 10 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 일반현황 | 영향률 | ~ | ~ | ~ | 17.40 | -11.60 | -0.64 | 14.76 | -6.94 | 20.19 | -12.37 | 9.79 | 1.33 | 11.90 | -0.78 | | | | | 19.30 |
| 11 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 일반현황 | 적용대상 근... | ~ | ~ | ~ | 20,446.00 | 0.73 | 1.41 | 2.64 | 1.03 | 3.04 | 0.63 | 2.55 | 1.70 | 2.77 | 1.48 | | | | | 20,350.00 |
| 12 | 2022 ... | 보건·복지·고용 | 노동(고용) | 최저임금 일반현황 | 전년대비 인... | ~ | ~ | ~ | 5.05 | -38.31 | -6.48 | 24.67 | -41.31 | 41.17 | -57.80 | 15.98 | -11.00 | 22.72 | -17.75 | | | | | 3.14 |
| 13 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 95~99세 | ~ | 17,644.00 | 7.75 | 13.59 | 27.54 | 6.43 | 32.82 | 1.15 | 22.56 | 12.98 | 24.96 | 10.59 | | | | | 16,113.67 |
| 14 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 65~69세 | ~ | 1,725,554.00 | 7.50 | 5.63 | 6.78 | 3.29 | 7.65 | 2.42 | 5.28 | 3.65 | 5.68 | 3.24 | | | | | 1,618,26... |
| 15 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 70~74세 | ~ | 1,266,715.00 | 4.50 | 3.57 | 4.92 | 1.10 | 5.88 | 0.15 | 3.23 | 1.58 | 3.64 | 1.17 | | | | | 1,220,27... |
| 16 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 35~39세 | ~ | 1,560,649.00 | -5.36 | -2.41 | 1.27 | -4.11 | 2.62 | -5.46 | 0.04 | -1.80 | 0.51 | -2.27 | | | | | 1,659,76... |
| 17 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 65세이상 | ~ | 5,131,820.00 | 5.35 | 5.07 | 5.23 | 4.65 | 5.37 | 4.51 | 4.99 | 4.73 | 5.05 | 4.66 | | | | | 4,884,56... |
| 18 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 85~89세 | ~ | 336,712.00 | 10.20 | 10.55 | 11.41 | 10.39 | 11.66 | 10.14 | 11.46 | 10.69 | 11.66 | 10.50 | | | | | 308,691.00 |
| 19 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 20~24세 | ~ | 471,206.00 | -1.24 | -0.11 | 2.17 | -0.71 | 2.89 | -1.43 | 2.56 | 0.48 | 3.07 | -0.03 | | | | | 480,496.67 |
| 20 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 100세이상 | ~ | 2,016.00 | 12.76 | 11.13 | 20.03 | -11.37 | 27.88 | -19.22 | 9.24 | 0.36 | 11.46 | -1.85 | | | | | 1,779.67 |
| 21 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 80~84세 | ~ | 721,252.00 | 6.23 | 7.10 | 9.09 | 6.20 | 9.82 | 5.48 | 9.40 | 7.34 | 9.91 | 6.82 | | | | | 674,519.67 |
| 22 | 2022 ... | 보건·복지·고용 | 인구 | 가구주의 성/연령별 추... | 계 | 계 | 60~64세 | ~ | 2,385,791.00 | 4.56 | 5.65 | 7.59 | 5.36 | 8.14 | 4.80 | 6.91 | 5.77 | 7.20 | 5.48 | | | | | 2,300,91... |

# 2-5. Phase 2 Policy Dashboard for Key Policy Issues

Display key policy indicators including demographics, employment, local livelihoods, external volatility for in-depth monitoring

Example

## Policy State Management Dashboard

## Key indicators for policy state management

- Indicators needed for policy making, such as demographic structure and change
- Employment state, job creation and quality, the status of fiscal expenditure
- Indicators related to the early detection of and response to local livelihood challenges
- External volatility indicators (cross-border finance, exports, etc.)

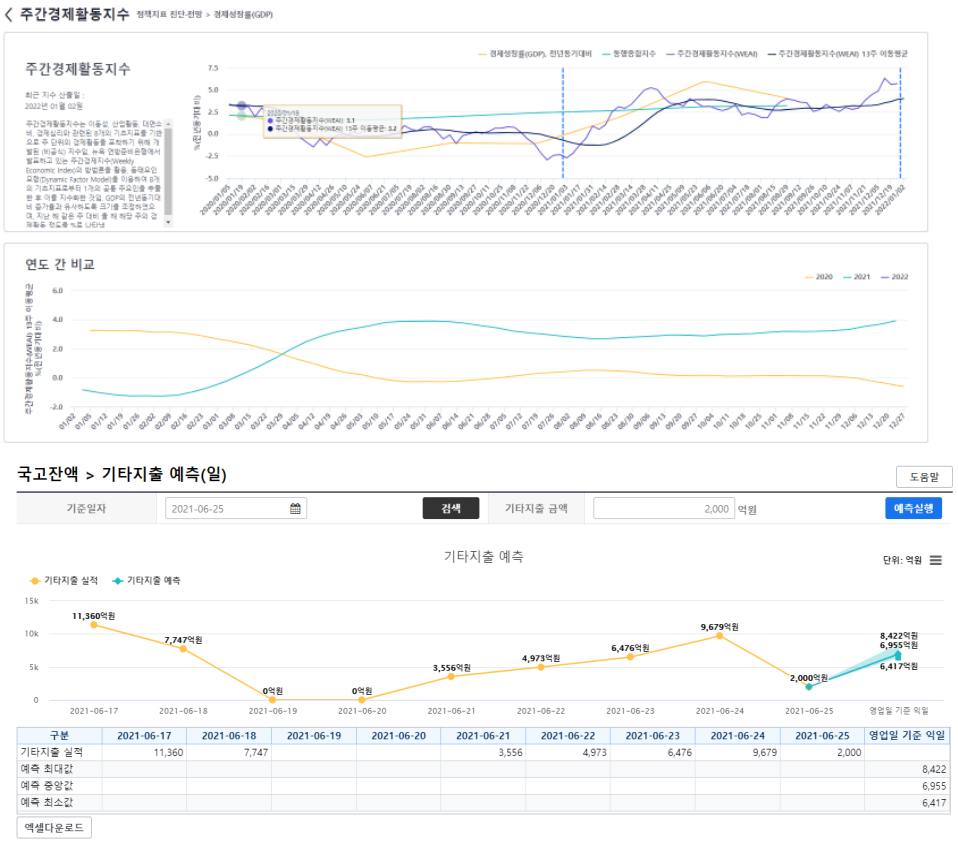
| Demographics | Employment | Local livelihood | External volatility |
|---|---|---|---|
| Population projection | Fiscal projects for job creation | Government subsidy | Trade, Fiscal project |
| Working-age population | Employment rate | Fine dust | Import/Export |
| Number of births | Unemployment rate | House price index | Exchange rate |
| Total fertility rate | Youth unemployment | Unemployment benefits | Foreign exchange reserves |
| Total dependency ratio | Non-regular workers | Electricity consumption | International balance of payments |
| … | … | … | … |
| 37 indicators | 21 indicators | 30 indicators | 24 indicators |

# 2-6. Phase 3 AI and Data-Driven Diagnosis and Forecasting of Policy Indicators

Leverage AI technologies to conduct fiscal estimates, including data-driven GDP forecasting and balance of payments analysis

Example

## Dashboard for policy state diagnosis and forecasting




| 구분 | 2021-06-17 | 2021-06-18 | 2021-06-19 | 2021-06-20 | 2021-06-21 | 2021-06-22 | 2021-06-23 | 2021-06-24 | 2021-06-25 | 영업일 기준 익일 |
|---|---|---|---|---|---|---|---|---|---|---|
| 기타지출 실적 | 11,360 | 7,747 | | | 3,556 | 4,973 | 6,476 | 9,679 | 2,000 | |
| 예측 최대값 | | | | | | | | | | 8,422 |
| 예측 중앙값 | | | | | | | | | | 6,955 |
| 예측 최소값 | | | | | | | | | | 6,417 |

### Key indicators for policy state diagnosis and forecasting

- **GDP Forecast**
  - Use the latest econometric models and artificial intelligence technologies to get a quick picture of the economic situation in real time.

  Weekly economic activity index : Using daily and weekly indicators to quickly assess economic conditions

  GDP Nowcasting : Leverage economic time series to update GDP forecasts in real time

  AI (deep learning) based GDP forecast : Using a deep learning model (GRU Cell) to predict economic growth

- **AI-based financial estimation**
  - Use artificial intelligence to learn historical financial patterns to estimate projections that reflect external economic conditions

- **Analysis of the impact of fiscal investments**
  - Using AI and big data technologies, the effectiveness of fiscal investments in 12 areas will be analyzed over a long period of time.

# 3-1. Data Analysis Service (KODAS) – Data Analysis Infrastructure

Provide a space for government officials and researchers to use and analyze AI-powered data and strengthen data analytics competencies

## Implement data-driven administration and digital government platform

**KODAS**

(Korea Data Analysis Service)

### ① Build data platform

- Fiscal data
- Data on economic and social indicators
- Data from the administrative and public sector
- Private sector data

### ② Infrastructure for AI data analysis

- Provide online (for public officials) and offline labs (for private sector researchers)
- Offer AI analysis tools, such as Python
- Provide a user-friendly UI

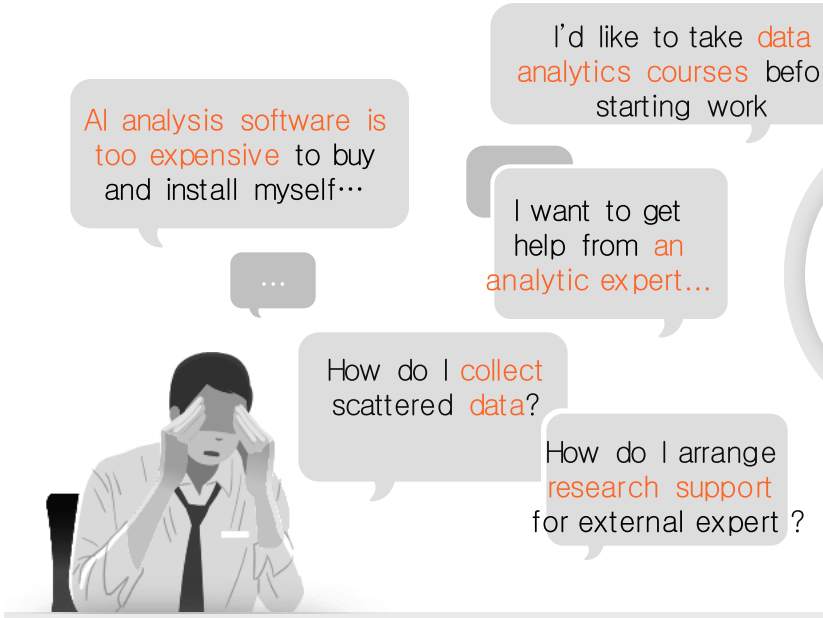
### ③ Strengthen data analytics competencies

- Opened a data analysis/education center (Aug. 2022, Sejong)
- Run a multi-level data scientist (DS) training program
- Provide customized consulting
- Expand partnerships with other educational organizations

# 3-2. Data Analysis Service (KODAS) - Objective of Introduction

## Implement a work environment essential for AI and data-driven scientific public administration in the digital age

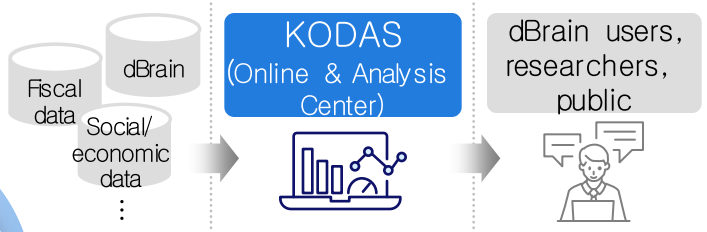
In an environment focused on simple statistical analysis, primarily using Excel, big data-driven(AI) advanced analysis is insufficient.




I'd like to use the latest AI technologies for task analysis and future forecasting…

INSIGHT
Gaining INSIGHTS through diverse analyses

An AI-enabled analytics environment is provided to link fiscal data and socioeconomic indicators
Lay the groundwork for data-driven decision support across the entire government




- Provide financial, social, and economic data and AI-powered analysis infrastructure
- Organize contests, analytics case sharing, specialized training, consulting, etc.

**Working-level decision makers**

- Provide an analysis environment accessible anytime - Connect to real-time data
- Broader application of analysis results to work within the organization
- Share analysis results and create a virtuous cycle of best practices

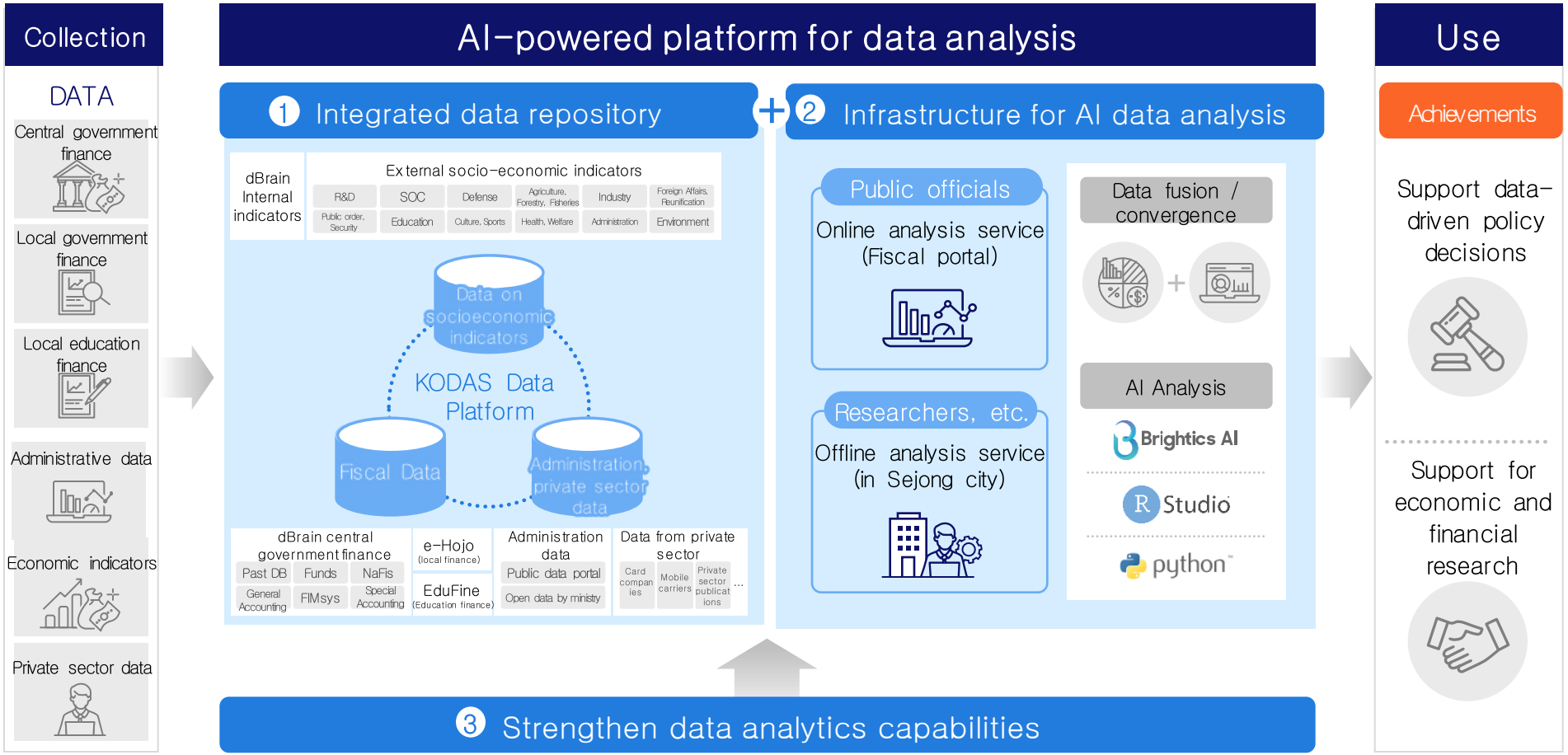
+

**Academia, Research institutions**

- Support experts in their research on convergence analysis of financial-socio-economic data
- Facilitate the 4th Industrial Revolution (Korean New Deal) by fusing and analyzing public-private data

# 3-3. Data Analysis Service(KODAS) - Operational Framework

Consist of an integrated data repository, infrastructure for AI-powered data analysis, and education program to train data scientists in order to facilitate data-driven policymaking and research in the economy and public finance



# 3-4. Data Analysis Service (KODAS) - Education program to train data scientists

## A 3-level education program has been established to train data scientists (DS) to enhance data analytics competencies

Level 1 Online Basics (Introduction) → Level 2 Online Basics (Application) → Level 3 Fiscal Data Scientist (FDS)

### Requirements

**Training demands**

- Design a multi-phased learning program to produce analytics experts
- Organize courses where students learn from real-world examples and apply what they have learned right away

**Required competences**

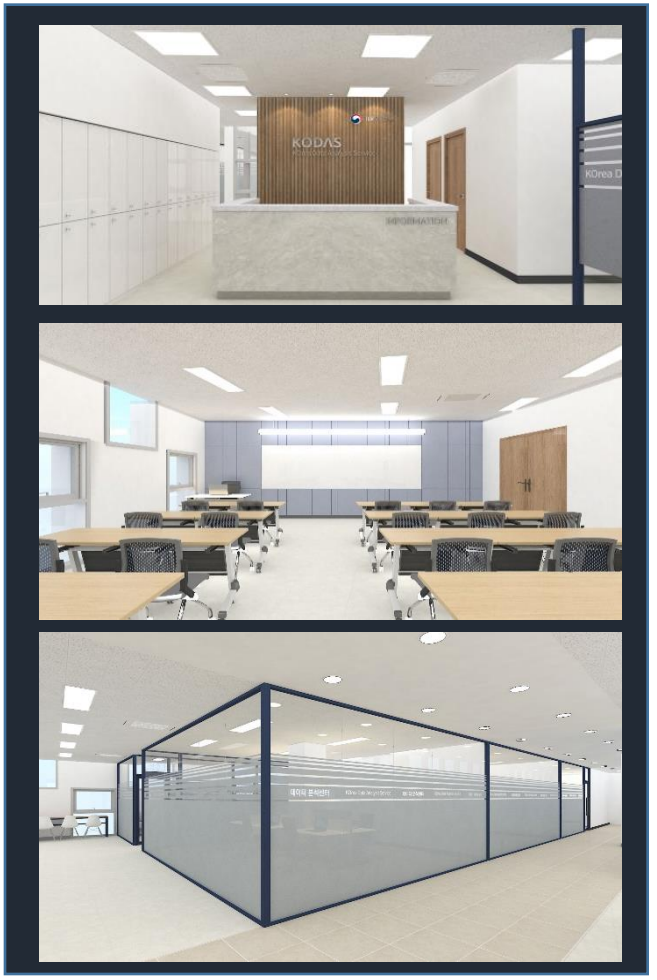
- Data analytics competence
- Big data processing skills
- Statistical knowledge

### Program Highlights

| | Basics (Introductory/Practice) | Advanced |
|---|---|---|
| Who should take this course | Undergraduate (or graduate) students or the general public who are interested in fiscal data analysis<br>*The program is completely free. | |
| Program schedule | June 21, 2023 (starting at 13:00)<br>- December 21, 2023 (ending at 23:59)<br>(Participants can enroll in the Introductory and Practice courses at the same time and attend classes at their own pace) | The classes will be organized 2 or 3 times a month starting from June 2023<br>(Please refer to the website of Codepresso for detailed schedule) |
| How to take classes | Online, always-on learning (24/7, 365 days a year) | Participants enroll online and take the course offline on a rolling basis |
| Curriculum | 1. Introduction of Statistical Analysis<br>1) Data Analytics<br>2) Brightics AI and Other Analysis Tools<br>2. Data Analytics Environment Setup<br>3 Practice of Data Analytics<br>1) Data Analytics Process<br>2) Data Collection/Process<br>3) Data Analytics/Visualization<br>*Brightics AI :AI-powered data analytics and visualization platform | 1. Statistical Analysis<br>1) Data Sampling<br>2) Regression Analysis, Logistic Regression Analysis<br>2. Machine Learning<br>1) Regression/Classification Models<br>2) Time Series Analysis<br>3) Unsupervised Learning<br>3. Practice/ Project<br>1) Mini-project with the use of open data<br>2) Python/SQL Script |
| Note | (1) Certificate will be awarded to participants who complete 100% of the Basic Courses and 80% of the Advanced Course<br>(2) Eduation center : Fiscal Data Analysis Center, 2F, Sejong Building A, 87 Doum 8-ro, Sejoing City<br>(3) Please fill in your organization when registering for Basic Courses. | |

# 3-5. Data Analysis Service - [Reference 5] Data Analysis Center & Education Center in Sejong

Enable the private sector, including corporations and academic researchers, to analyze fiscal data using dBrain's analytics infrastructure.




This offline center provides an open environment for data analysis in a secure and protected setting. It is where the Data Scientist (DS) Program courses are held.

* Opened in August 2022

Korea Fiscal Information Service

# Thank you