AI-Supported Accounting and Advanced Analytics Project (Financial Intelligence)

October 2025

TASHKENT

Presentation Plan

01 **Integrated Public Financial Management Information System**

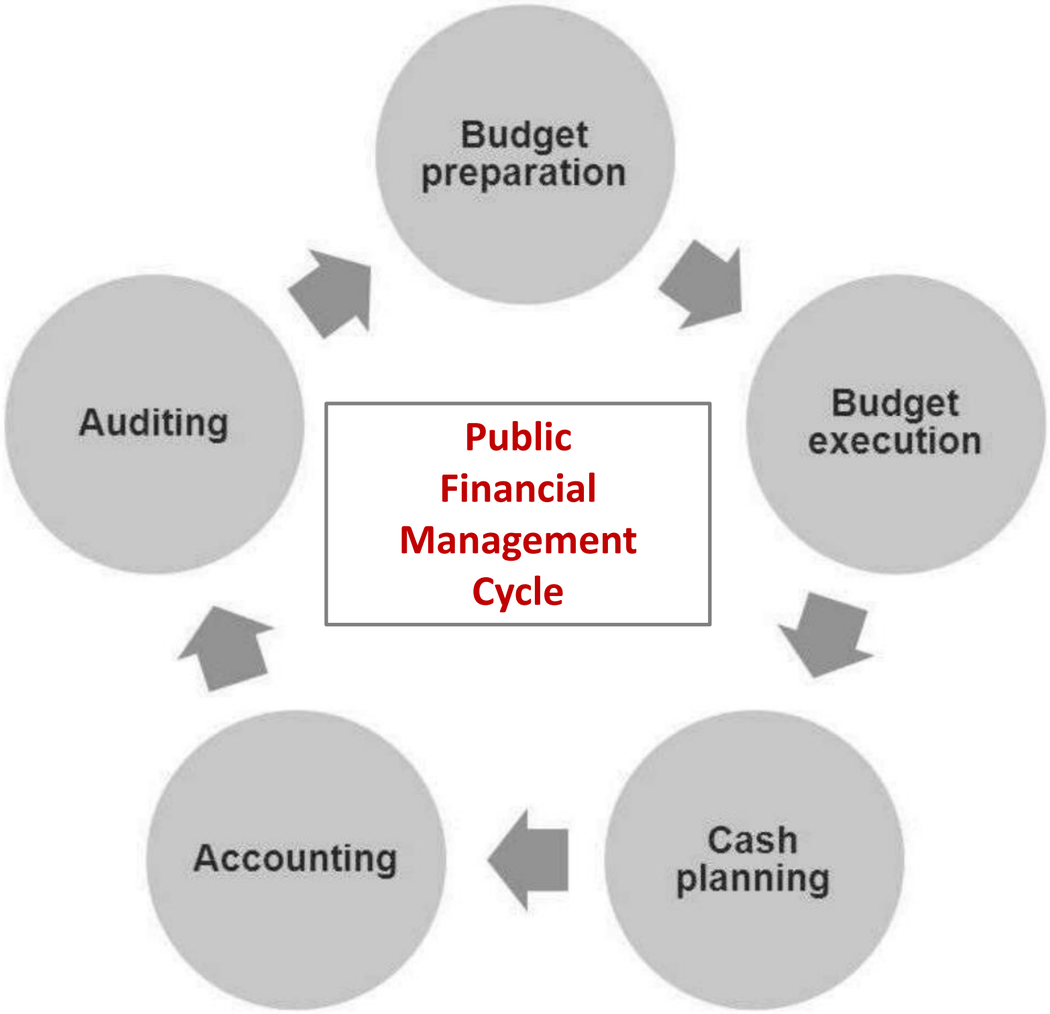
02 **AI-Supported Accounting and Advanced Analytics Project's Phase-1 Activities**

03 **Ongoing AI Projects**

- AI-Supported Accounting and Advanced Analytics Project's Phase-2
- Document Processing Project

Main Objective

Creating a set of systems (ecosystem) that aims to integrate the systems belonging to the functional processes within the public financial management cycle.



Historical Development of Türkiye’s FMIS

2017

Project were initiated within the scope of the policy document and action plan with high-level ownership.

2018

Applications developed within the scope of IFMIS were launched in terms of their basic functions.

2019-2025

The functionality and integration of applications have been improved. Also applications have been made supported by artificial intelligence.

2026 -

- New asset management system
- New salary system
- Open fiscal data portal
- New artificial intelligence projects will be implemented.

Türkiye FMIS

Initial Open Year:2017

Before FMIS

- Limited integration
- Form-based
- Physical Document
- Vendor Dependence
- Location Dependence (Intranet)
- Limited Data Production

After FMIS

- High integration with most systems
- Module-based
- e-Document/e-Signature
- Open Source technologies
- Location Independence (Internet)
- Big Data Production (Volume-Velocity-Variety)

Integrated Public Financial Management Information System

Collections
(e-Collection)

Receivables

Payments

Trust
Accounts

Decision Support System
Ad-Hoc Reporting
E- Audit

T.C. HAZİNE VE MALİYE BAKANLIĞI
KBS Uygulamaları
KBS

T.C. HAZİNE VE MALİYE BAKANLIĞI
Harcama Yönetim Sistemi
HYS

T.C. HAZİNE VE MALİYE BAKANLIĞI
Muhasebe Yönetim Sistemi
MUHASEBE

T.C. HAZİNE VE MALİYE BAKANLIĞI
Yönetim Bilgi Sistemi
YBS

- Open Source System
- Vendor Dependence until 2026
- Vendor Dependence

Artifical Intelligence Systems

Fiscal Statistics Systems

Asset System

It is the system where the movable transactions of public administrations at different budget levels are realized. As of 2026, in addition to movable transactions, immovable and intangible rights transactions will also be included in the system.

Salary (Payroll) System

It is the payroll calculation system for approximately 3 million staff and contracted personnel of public administrations at different budget levels. The payroll system is in the process of re-engineering and improvements will be made for different types of employment in 2026.

Expenditure Management System

It is the system where expenditure units of public administrations at different budget levels realize their expenditures using e-Document (ubl, xbrl), e-Invoice and e-Signature infrastructures.

Accounting Management System

It is a module-based system that allows public administrations at different budget levels to perform transactions, offers integration opportunities. It also has sub-modules like e-Collection and e-Guarantee

Management Information System

It is a system where reports prepared in line with the needs of public administrations at different budget levels are presented in numerical table format, and it is aimed to make them visualization-based by researching best practices in the world.

Integrated Public Financial Management Information System

System Users (Data Producers)

Approx. **500 Public Institutions**

Approx. **100.000 Spending Units**

Approx. **4.000 Accounting Units**

Approx. **400.000 Users**

Data Produced by The Systems

130 MILLION LINES OF SINGLE-ENTRY ACCOUNTING RECORDS

3 Million Salaried Personnel

18 Million Payment Order Documents

5.5 Million e-Signed Documents
10 Million e-Invoices

General Government Sector Fiscal Data

AI-Supported Accounting and Advanced Analytics Project

12-month big data and artificial intelligence project within the scope of the Integrated Public Financial Management Information System.

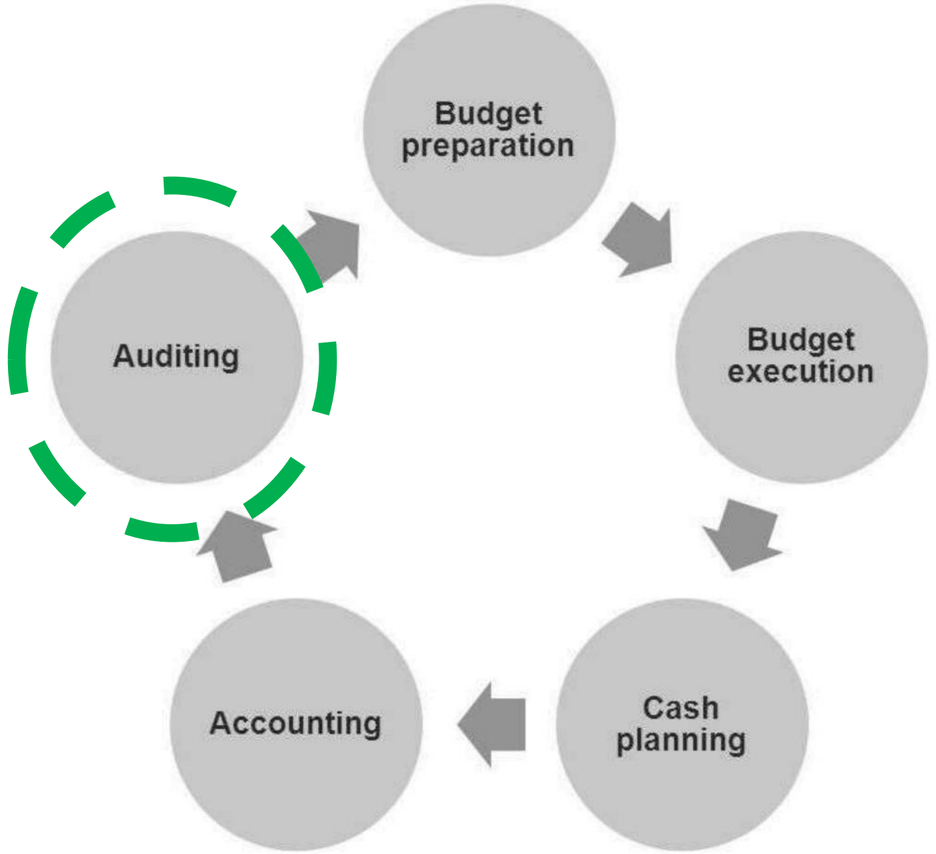
Project Objectives

- Increase efficiency, quality, and savings in public spending
- Improve decision-making and policy development processes
- Strengthen risk-based financial audit infrastructure

REASONS FOR IMPLEMENTING THE PROJECT

In order to fully functionize of auditing process in public financial management cycle;

We want to create a system that can automatically report anomalies based on data learning, rather than a rule-and query-based system based on business intelligence applications.



Main Outputs

Output -1:
Financial Intelligence Platform

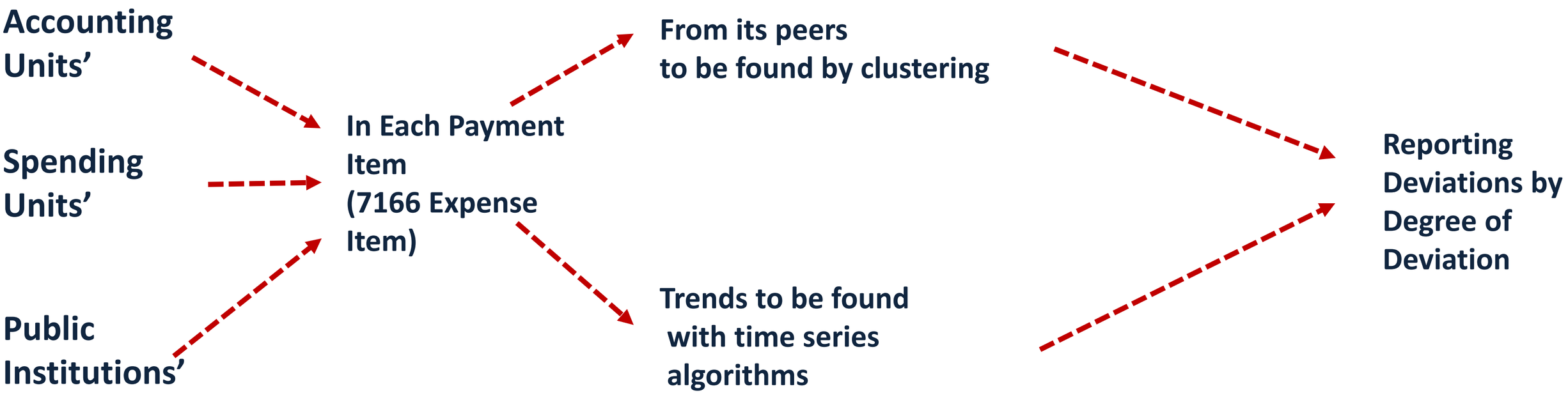
To analyze **completed** payments on **batch** data

Output -2:
Early Warning System

To analyze and make alerts for **pending** payments on **streaming** data

PURPOSE OF PHASE 1

Anomaly (Outlier) Detection



Deviation from both the peer and the monthly trend → RED FLAG + Risk Score Based on Deviation Degree

Deviation from peer or trend → YELLOW FLAG + Risk Score Based on Deviation Degree

ACTIVITIES CARRIED OUT UNDER PHASE-1

A. Batch Data Transfer:

Between January 2019 and August 2024, a total of 7TB:

Transfering data including:

- **148 tables related to accounting data**
- **114 tables related to payment data**
- **8 tables related to administrative procedures containing unit definitions**

ACTIVITIES CARRIED OUT UNDER PHASE-1

B. Literature Review

In order to use in the project and to convert the findings into an academic study;

2,840 academic studies on related fields were reviewed.

C. Performing Data Analysis:

- **Applying data preprocessing steps**
- **Performing exploratory data analysis**

D. Applying machine learning and time-series models

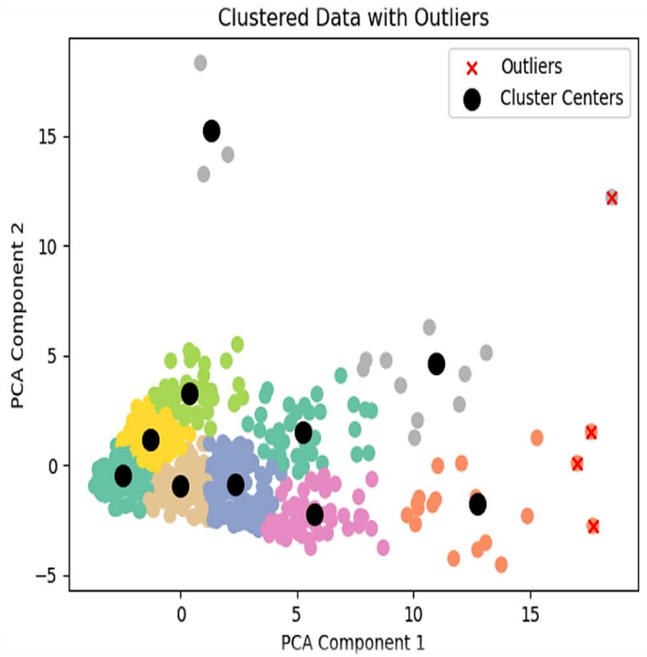
- Finding unit peers: Using unsupervised learning algorithms

- Finding trend deviations: Using time series algorithms

How Peer Finding Was Done?

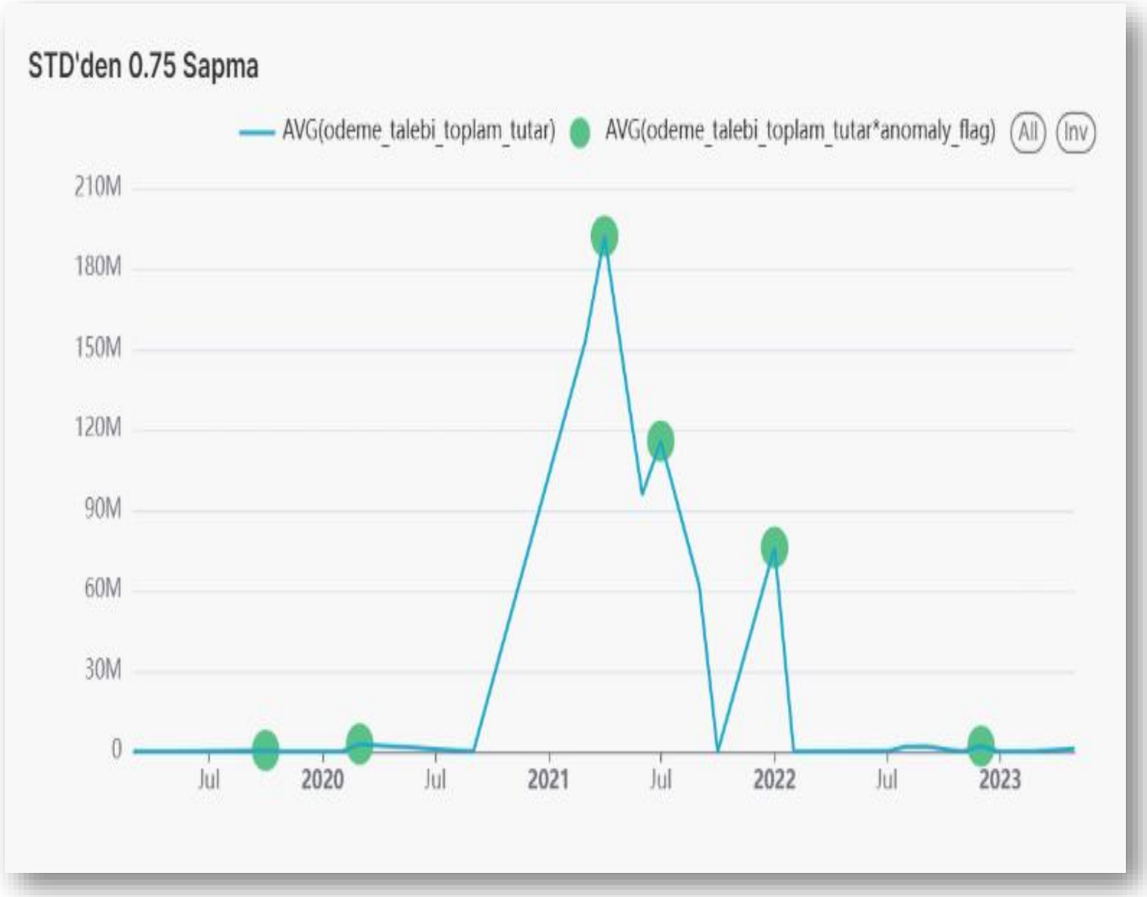
A clustering study (such as PCA algorithms) was conducted to **find peers in terms of transaction volume**.
In this context: A total of 529 candidate features were identified for clustering (features: transaction number, transaction variety, transaction size etc.).

When clustering spending units, separate clustering was performed based on public institution. For example Ministry of Justice's spending units are clustered among themselves.



How Trend Deviation Was Detected?

We implemented three-month windows and when payment exceeds a certain limit , the system considers this to be a deviation from the trend and marks the trend peaks.



SIGNALS PRODUCED BY THE FINACIAL INTELLIGENCE PLATFORM

Based on Accounting Unit Perspective

Cases with no Anomaly : 77%

Trend Anomaly: 21%

Cluster Anomaly: 1.2%

Trend and Cluster Anomaly: 0.8%

Based on Spending Unit Perspective

Cases with no Anomaly: 80%

Trend Anomaly: 18.2%

Cluster Anomaly: 1.2%

Trend and Cluster Anomaly: 0.6%

Based on Public Insititution Perspective

Cases with no Anomaly: 75.5%

Trend Anomaly: 22.5%

Cluster Anomaly: 1.1%

Trend and Cluster Anomaly: 0.9%

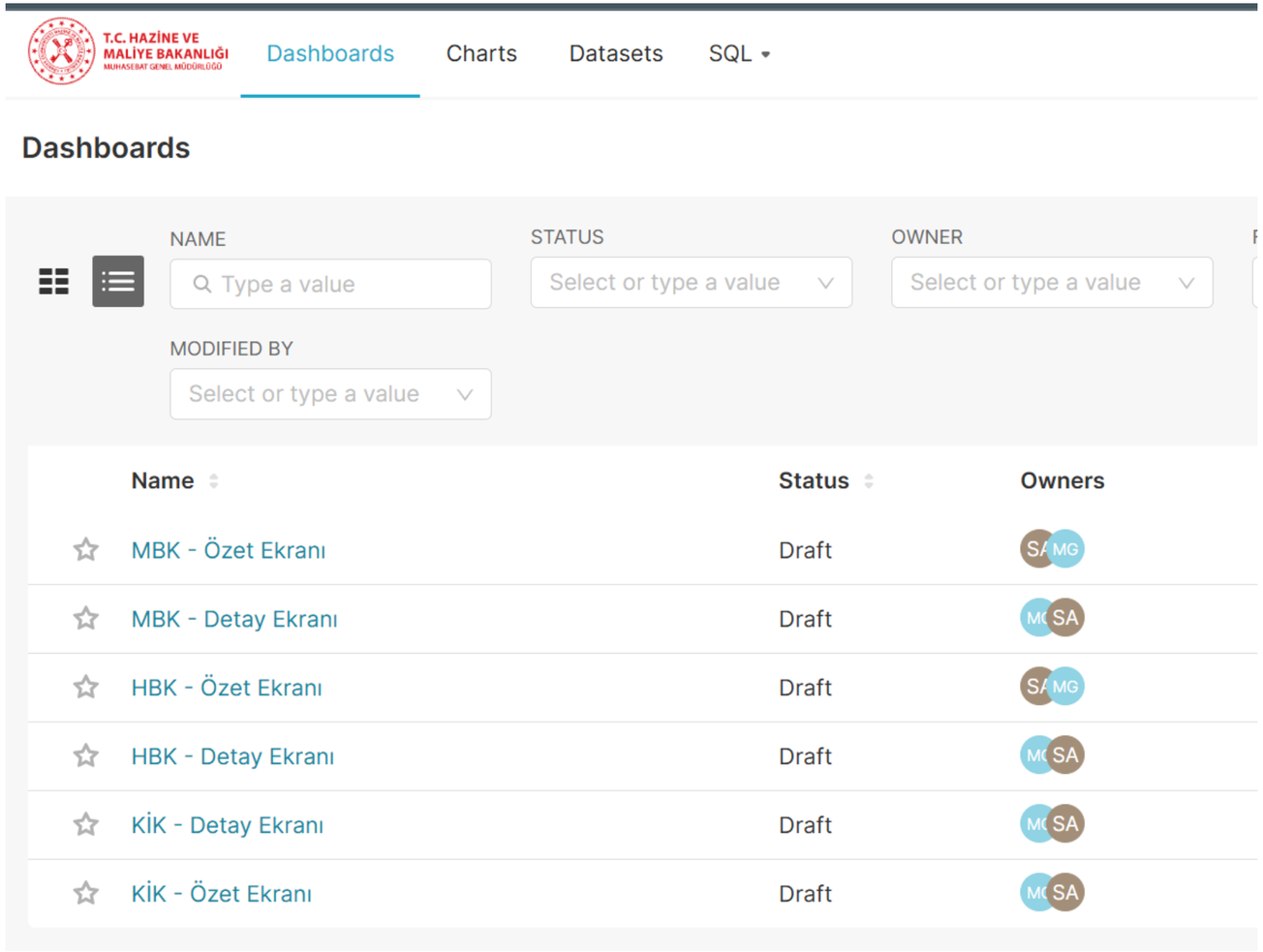
Transactions can be filtered by risk levels (such as low or high risk) and also ordered by risk scores

USE OF THE FINACIAL INTELLIGENCE PLATFORM

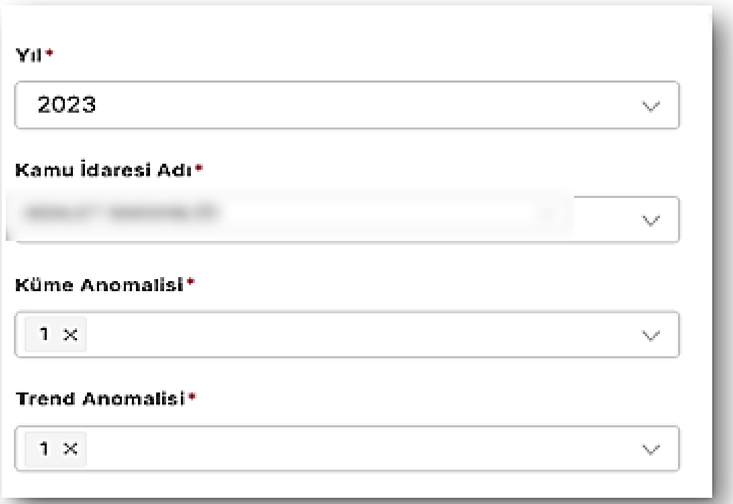
The Platform includes:
Summary and Detail Screens designed separately for Accounting Units- Spending Units- Public Institutions payments.

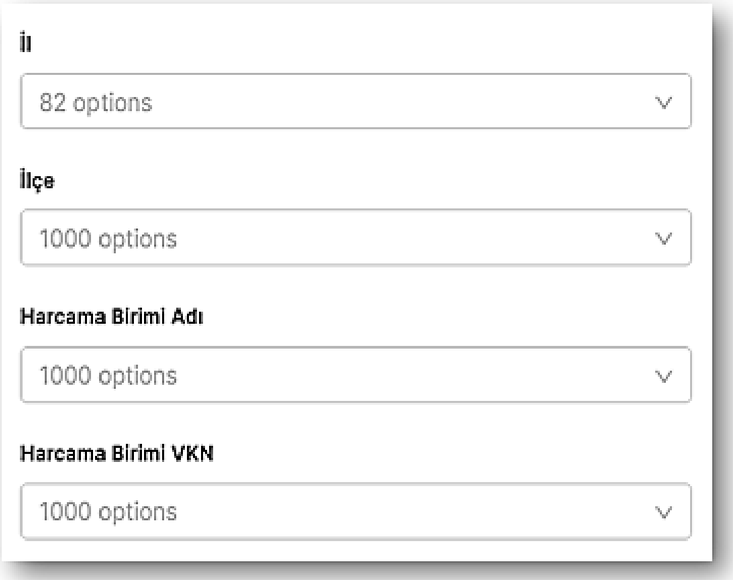
In Summary Screens:
All peer and trend deviations are produced irrespective of their units type or the year.

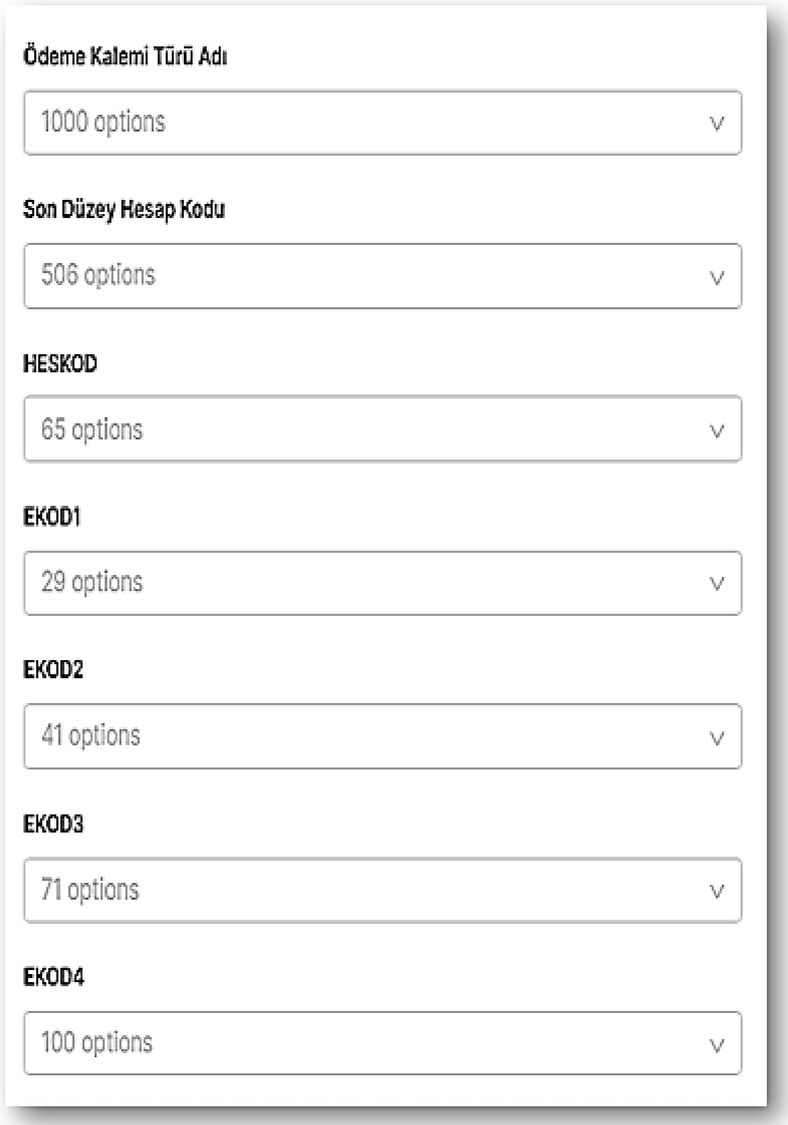
In Detailed Screens:
Risk level based cluster and trend deviations are produced for units in its own type and all detailed information of the selected payment can be reached.

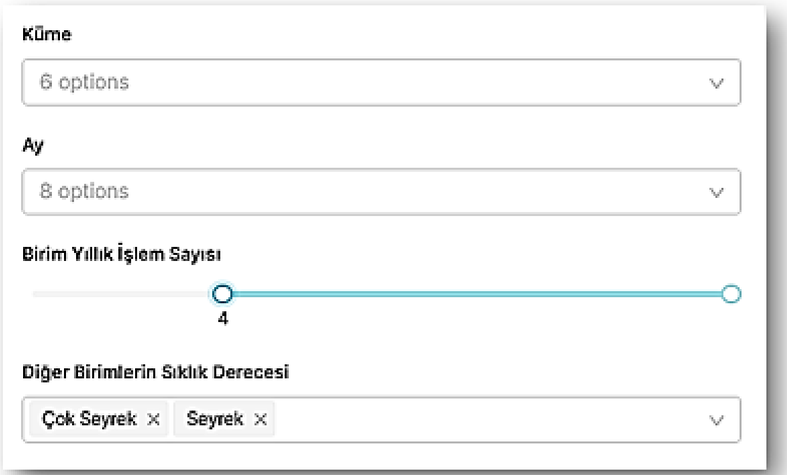


USE OF THE FINACIAL INTELLIGENCE PLATFORM
Filtering Sections









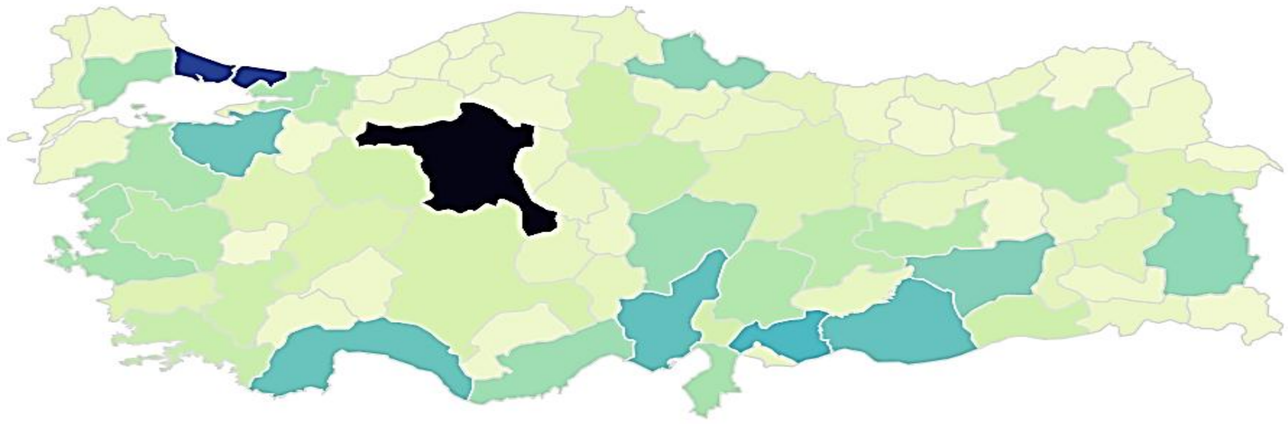
USE OF THE FINACIAL INTELLIGENCE PLATFORM

Result Dashboard

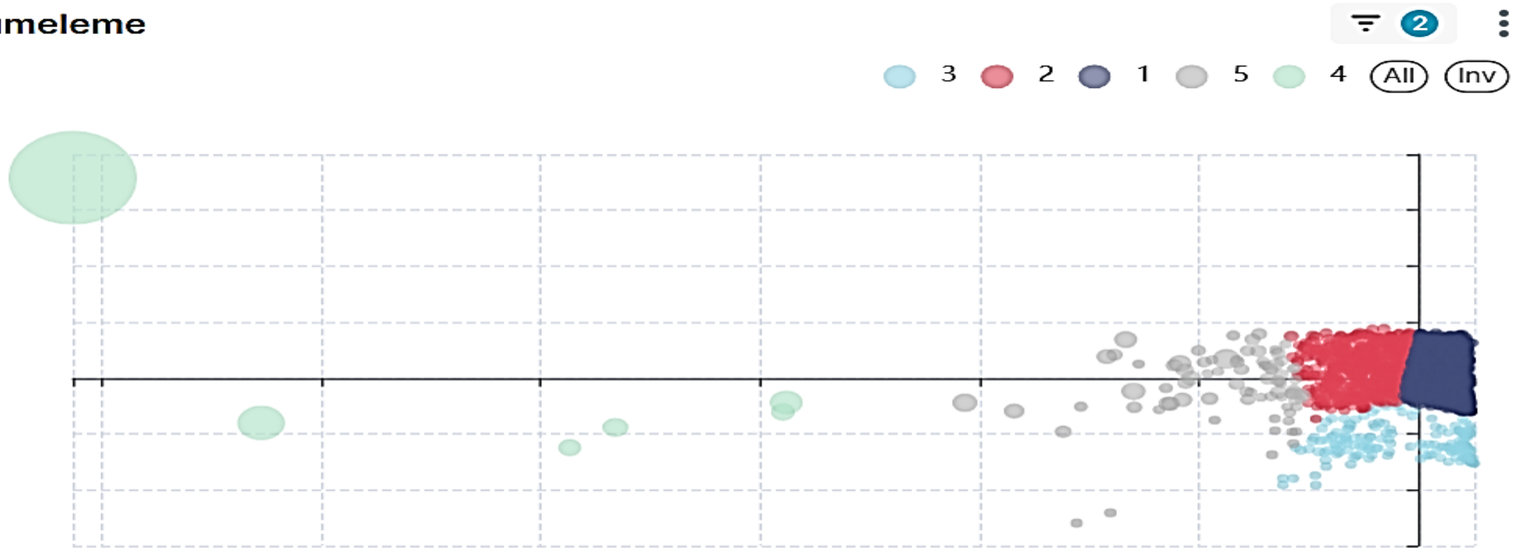
Harcama Birimi Sayısı

2.544

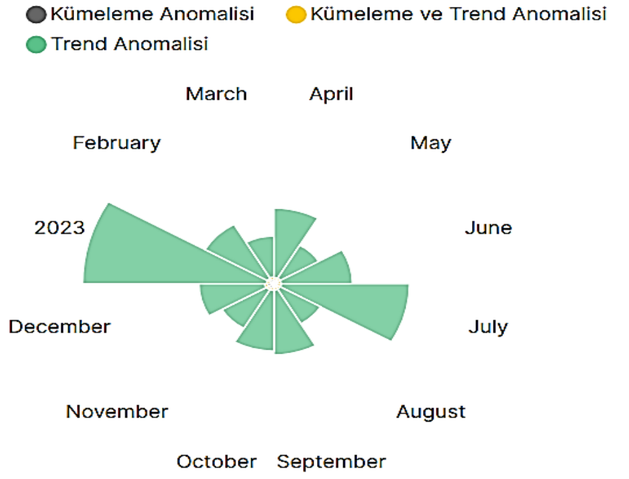
İllere Göre Anomali Sayıları



Kümeleme



Aylık Küme ve Trend Anomali Dağılımı



USE OF THE FINACIAL INTELLIGENCE PLATFORM

DETAIL OF RESULTS

Anomali Tablosu

Show 200 entries

Yıl	Ay	VKN	Harcama Birimi	Ödeme Kalemi Türü	Son Düzey Hesap Kodu	Ödeme Kalemi Tutarı	Küme Anomalisi	Trend Anomalisi	Küme	Birim Yıllık İşlem Sayısı	Diğer Birimlerin İşlem Sıklığı	Diğer Birimlerin Sıklık Derecesi
2023	ARALIK	[redacted]	[redacted]	Diğer Giderler - Gayrimenkul Büyük Onarım Giderleri	630.30.06.07.90	[redacted]	1	1	5	5	1	Çok Seyrek
2023	ARALIK	[redacted]	[redacted]	Tüketime Yönelik Mal ve Malzeme Alımları Kredisi - Krediler	160.02.03.02	[redacted]	1	1	2	11	1	Çok Seyrek
2023	ARALIK	[redacted]	[redacted]	Medikal Malzemeler	150.03.03	[redacted]	1	1	2	11	1	Çok Seyrek
2023	KASIM	[redacted]	[redacted]	Diğer Giderler - Gayrimenkul Büyük Onarım Giderleri	630.30.06.07.90	[redacted]	1	1	2	4	1	Çok Seyrek
2023	EYLÜL	[redacted]	[redacted]	Emanet	333.14	[redacted]	1	1	5	11	1	Çok Seyrek
2023	NİSAN	[redacted]	[redacted]	Diğer Giderler - Gayrimenkul Büyük Onarım Giderleri	630.30.06.07.90	[redacted]	1	1	2	7	1	Çok Seyrek
2023	TEMMUZ	[redacted]	[redacted]	Müşavir Firma ve Kişilere Ödemeler - Gayrimenkul Büyük	630.30.06.07.10	[redacted]	1	1	5	7	1	Çok Seyrek

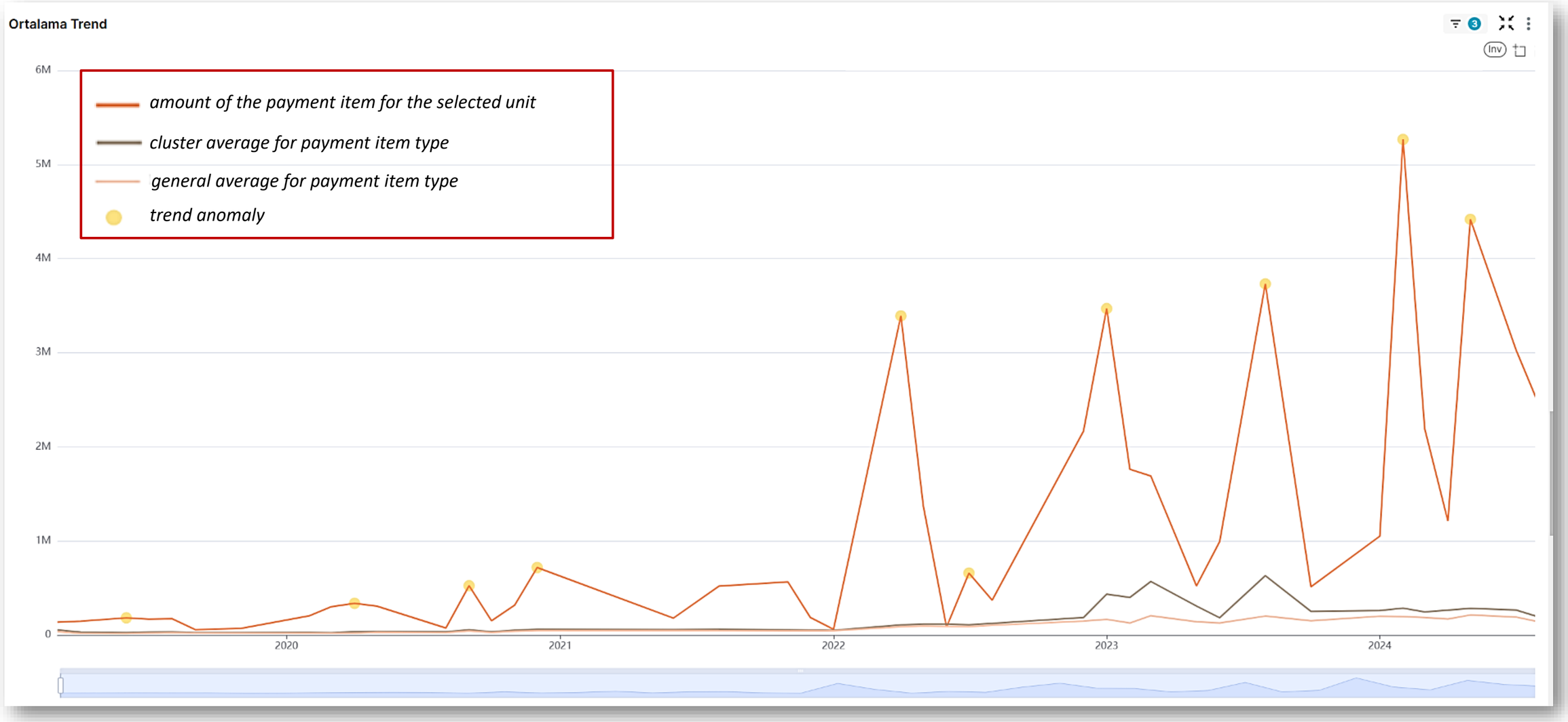
Ödeme Detay Tablosu

Search 309 records...

İmzalanma Tarihi	Kamu İdaresi	Muhasebe Birimi	Ödeme Kalemi Türü	Hesap Kodu	Harcama Birimi	VKN	Belge Numarası	Ödeme Tutarı	Ödeme Kaydı Numarası	Ödeme Yapılan Kişi Adı	Ödeme Yapılan Kişi Soyadı	Ödeme Yapılan TCKN	Ödeme Yapılan Kurum	Ödeme Yapılan VKN	Ödeme Kaydı Açıklama
[redacted]															

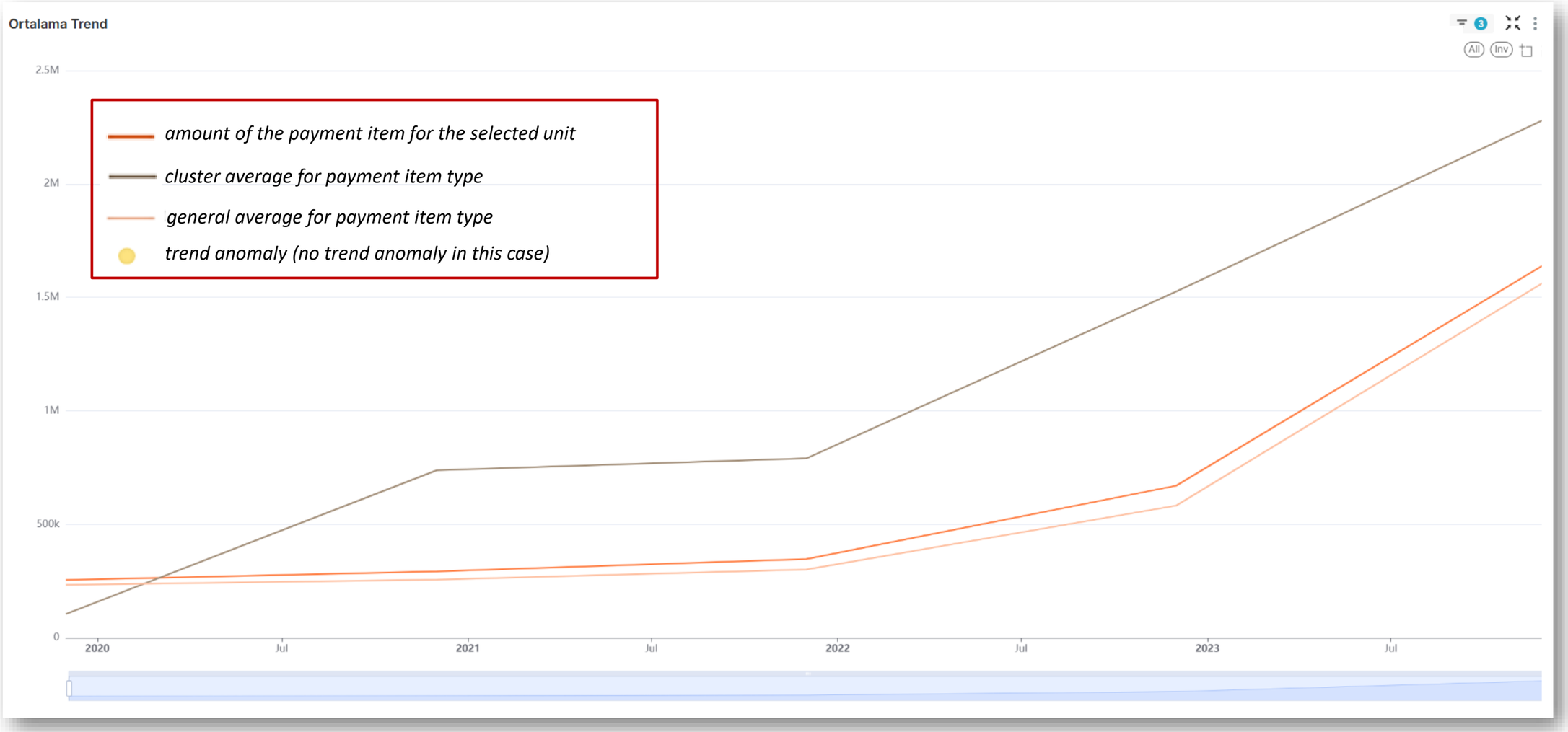
USE OF THE FINACIAL INTELLIGENCE PLATFORM
TREND CHARTS

A CASE OF CLUSTER AND TREND ANOMALY



USE OF THE FINACIAL INTELLIGENCE PLATFORM
TREND CHARTS

A CASE WITHOUT CLUSTER AND TREND ANOMALY



ACTIVITIES CARRIED OUT UNDER PHASE-1

E. Development of Financial Intelligence Platform

- Improving effectiveness of peer finding processes and time-series algorithms

- Adding Benford’s Law-based techniques to the platform

ACTIVITIES CARRIED OUT UNDER PHASE-1

F. Detection of Fraud (Semi-Supervised Learning)

Based on the previous findings of financial intelligence platform and other audit activities we used semi-supervised learning techniques to find similar payments.

ACTIVITIES CARRIED OUT UNDER PHASE-1

G. Creation of Early Warning System

Under this scope, a newly designed system will make predictions on the basis of the past trend in streaming data with supervised learning and offer separate screens to the users of accounting system according to the predicted deviation of the performed payment.

If there is an anomaly, accounting system user;

1. Can resend the transaction to the expenditure unit

Or

2. Proceed the transaction by giving explanation (and those explanations will be analyzed)

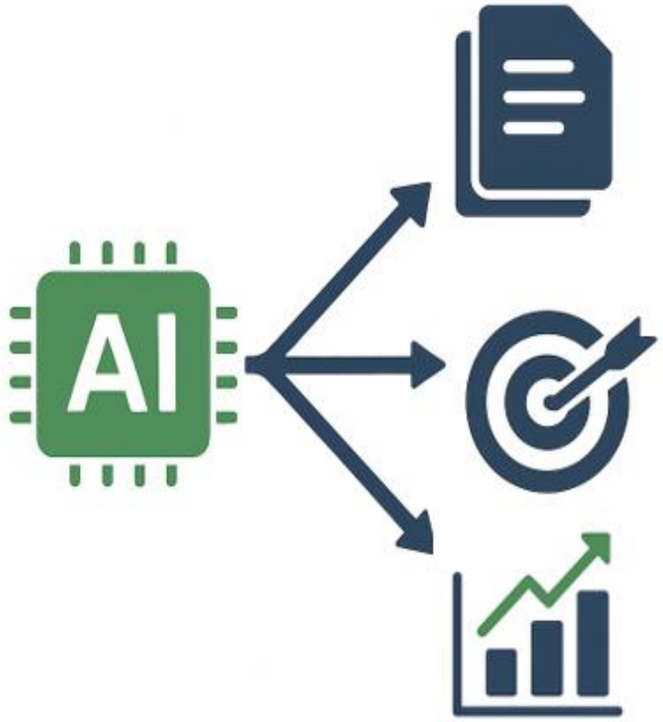
AI-Supported Accounting and Advanced Analytics Project (Phase-2)

Main Objectives - Methods:

To establish of an audit infrastructure; Phase 1's findings will be shared with relevant public administrations (strategy and audit units)

To increase the effectiveness of policy-making activities; correlation, lead, and lag analyses among public expenditures will be conducted

To improve the quality of financial statistics, to support financial decision-making processes, and to strengthen the Treasury's cash and debt management processes; artificial intelligence-supported forecasts of budget revenues, budget expenditures, and cash demands will be performed.



Document Processing Project

Method:
Converting scanned payment documents into digital format by using image processing Technologies (such as OCR).

Objective:
To increase the effectiveness of control, audit, analysis, system, and resource planning processes.

Achivements:
1. Making scanned documents querable by digitizing them,
2. Applying control steps on scanned documents,
3. Preventing the use of the same scanned document in different payments,
4. Ensuring that users select the correct payment types/account codes to improve data quality.

THANK YOU FOR YOUR ATTENTION

AYDIN YILMAZ

HEAD OF DEPARTMENT
AI AND DATA ANALYSIS DEPARTMENT
GENERAL DIRECTORATE OF PUBLIC ACCOUNTS
MINISTRY OF TREASURY AND FINANCE
TÜRKİYE