PEMPAL TREASURY COMMUNITY OF PRACTICE (TCOP)

Thematic Group on the Use of Information Technologies in Treasury Operations

Videoconference, April 25, 2024

Introduction

1.   On April 25, 2024, the PEMPAL Treasury Community of Practice (TCOP) held a videoconference (VC) to learn about the approach of the Treasury of Indonesia to using data analytics in treasury operations and firm up the agenda for the TCOP Annual Plenary in Belgrade. The meeting was attended by 45 TCOP participants from 19 PEMPAL countries (Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyzstan, Moldova, Montenegro, North Macedonia, Romania, Serbia, Tajikistan, Türkiye, and Uzbekistan). The meeting was facilitated by the World Bank resource team comprising Ms. Elena Nikulina (TCOP Resource Team Leader), Mr. Cem Dener (Chair of Financial Management Information Systems CoP, Governance GP); Mr. Mark Silins (TCOP Thematic Advisor); Ms. Galina Kuznetsova (PEMPAL TCOP Resource Team Member), Ms. Elena Dobrolyubova (TCOP Resource Team Member), and Ms. Tetiana Shalkivska (TCOP Secretariat).

2.   **Ms. Elena Nikulina, the TCOP Resource Team Leader**, opened the videoconference. She welcomed the participants and presented the meeting agenda. Ms. Nikulina highlighted that the meeting was organized as a preparation for the discussions at the 2024 TCOP Plenary Meeting in Belgrade which will focus on using the new IT tools in treasury operations. Ms. Nikulina also took the opportunity to congratulate **Mr. Erekle Gvalagze, Treasury of Georgia,** who had been elected a new Chair of the TCOP Executive Committee.

3.   **Mr. Erekle Gvalagze, Treasury of Georgia, TCOP Executive Committee Chair** greeted the participants and thanked all member countries for their support. He also encouraged all the participants of the upcoming 2024 TCOP Plenary Meeting in Belgrade in June to be ready to exchange experiences and share ideas about the future vision of treasury institutions and the TCOP. Mr. Erekle Gvalagze highlighted that digital transformation and the increasing use of artificial intelligence (AI) would play a growing role in treasury operations. Climate change presents another global challenge to the sustainability of public finance and calls for more attention to developing risk management in national treasuries. The approaches to meeting these challenges by the national financial systems would be at the centre of future TCOP discussions.

4.   **Mr. Nazim Gasimzadeh, Director of the State Treasury Agency, Azerbaijan,** welcomed Mr. Erekle Gvalagze in his new role and underscored that the national treasuries stayed at the door of the technological challenges posed by AI. Unlike in the past when the needs of functional departments defined the development of IT systems, it is now the new technology that is driving organizational change by providing new opportunities. Thus, the question of how treasuries could use AI for going further becomes more and more important.

5.   **Ms. Elena Nikulina** pointed out that treasuries were always the first to embrace new IT tools in the government as the development of financial management information systems (FMIS) started with automation of treasury functions. She also passed the floor to **Ms. Sandra Vraneš, Assistant Director for Budget Execution Sector,** who is the focal point for preparing the plenary in Belgrade in the Treasury Administration of Serbia.

6. **Ms. Sandra Vraneš** welcomed all the participants to Belgrade in June. She informed the participants that the Treasury Administration of Serbia planned to prepare four presentations to get the participants familiarized with Serbian experience in treasury operations. Also, Ms. Sandra Vraneš expressed hope that once the government is fully formed after the elections, another presentation on the general progress in e-government in Serbia could be arranged.

7. <u>Using Data Analytics in Treasury Operations: Approach of the Treasury of Indonesia</u>

8.   **Mr. Erwin Ariadharma, Sr. Public Sector Specialist, World Bank (Jakarta office)**, provided a brief overview of the World Bank's support for the Treasury of Indonesia under the Public Financial Management Multi-Donor Trust Fund Program. While the World Bank established a long-term cooperation with the Indonesian Ministry of Finance, introducing digital technology in treasury operations was a relatively new focus for this support.

9.   **Mr. Daniel Ortega Nieto, Sr. Public Sector Specialist, World Bank (Jakarta office),** presented the approaches to the Data Analytics Readiness Assessment (DARA) that was underway in the Treasury of Indonesia. The DARA methodology was developed based on several existing approaches to technology readiness assessments and adapted to the needs of the Ministry of Finance. The methodology comprises 6 main topics: Demand and Supply for Data Analytics, Data and Data Management, Data Analytics Techniques, People and Culture, Technology, and Organization and Regulation. The methodology contains specific readiness indicators on each subtopic that help to identify the factors that enable or hinder the implementation of data analytics and develop a roadmap for improving the use of data in the Ministry of Finance. Currently, DARA is a pilot project, but this pilot is expected to result in a solid methodology that will eventually be published by the World Bank. It is expected that in the future the World Bank will support the implementation of DARA in other countries, so PEMPAL member countries may indicate their potential interest in such future cooperation.
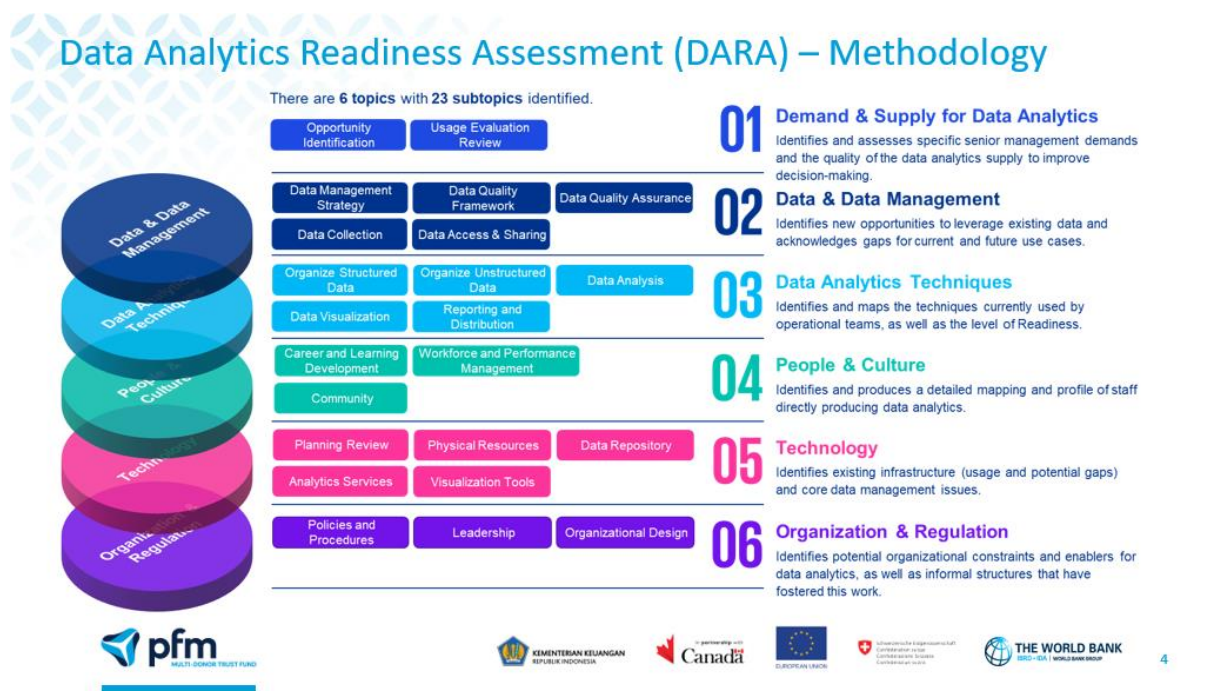
10.   **Mr. Ahmad Iqbal Zakyuddin, Head of the Section of Treasury Data Science and Management I, Ministry of Finance of Indonesia**, made a comprehensive presentation on the implementation of data science in the Directorate General of the Treasury. He highlighted that the Big Data project was supported by the Minister of Finance who committed to a longer-term vision of the ministry as a data-driven organization using the potential of the data to raise the efficiency and effectiveness of its operations. The initiative to implement data science in treasury started two years ago and it is expected that by 2030 the Ministry of Finance will use a data science-assisted FMIS. The critical role of the Treasury DG in this initiative stems from the fact that 80 percent of the Ministry of Finance's data is produced by the treasury. Thus, under the Big Data initiative, the treasury aims to use advanced analytics techniques to analyze financial data, identify patterns, forecast trends, optimize processes, and make data-driven decisions.

11.   The Big Data initiative in Treasury DG is based on both internal data and external data sources, such as statistical data, Bloomberg data, etc. Working with data involves data collection, validation, cleansing, aggregation, and transformation. The outputs include a visualization dashboard based on real-time data and an open data portal, a facility to download data, and some AI-based solutions supporting the decision-making process. The outputs of the project are already used in the treasury headquarters. Mr. Zakyuddin emphasized the importance of raising data awareness among the treasury staff as proof of output usefulness stimulates staff engagement in further initiatives. In particular, this relates to the open data that allows staff in the regional offices to extract the data and generate reports tailored to their needs.
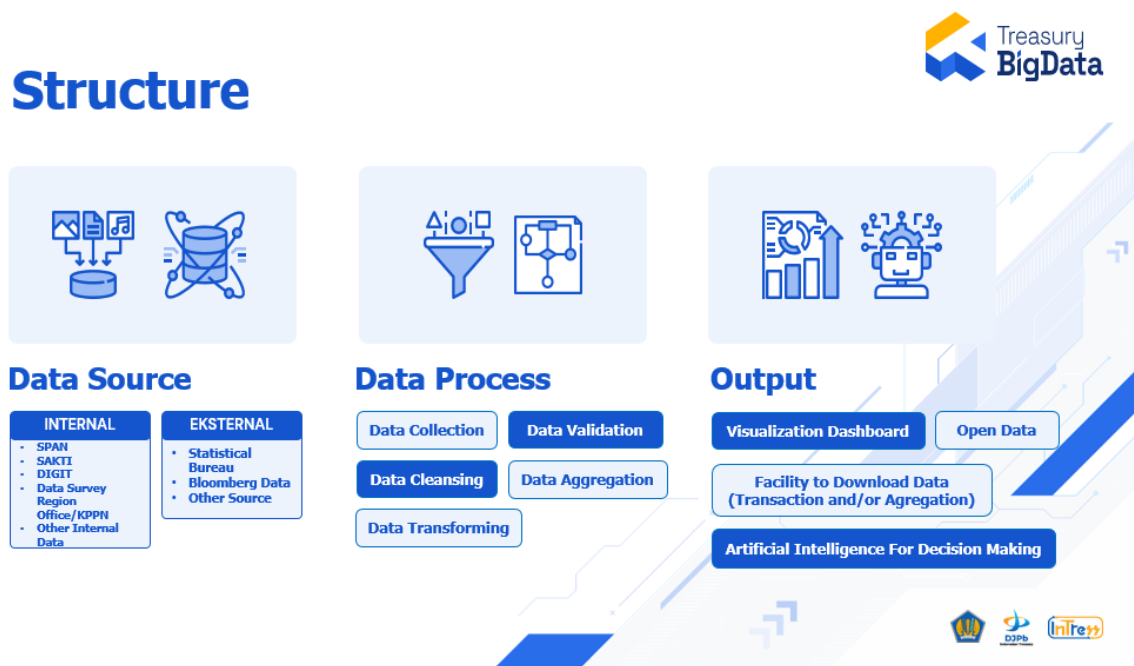
12.   **Mr. Zakyuddin** shared an interesting approach to selecting the specific areas where data analytics is implemented in treasury operations (i.e., cases). First, some cases are derived from the business needs outlined by the business process owners (i.e., functional units of the treasury). Second, benchmarking with other agencies and countries is carried out to account for the international experience. Third, special Data Analytics Competitions are carried out among the treasury staff which also helps to raise data analysis skills and promote data analytics at the subnational level. Workshops and focus groups also help to identify and specify data analytics needs and prospects. Overall, about 150 cases of possible use of data analytics in treasury operations have been identified so far.

13.   **Mr. Zakyuddin** identified five Treasury Big Data Products: Open Data, Dynamic Dashboard, Artificial Intelligence, Data Analytics, and Machine Learning. **The Open Data** provides access to the treasury data and the data from external sources for the Ministry of Finance and external clients. The programming interface allows users to choose the data they need and to create an API link or a CSV/XLS file. The data is accessible both via the Internet and Intranet. **The Dynamic Dashboard** is intended for the leadership of the Ministry of Finance and Treasury DG. It uses real-time data on government expenditures, including regional subsidies, and informs decision-making.

Treasury Big Data (Products)

Open Data
Download | Upload | Request

Dynamic Dashboard

Descriptive, Predictive, and Prescriptive Analytics.

Artificial Intelligence
Natural Language Processing;
Digital Assistance (BOT);
Detection and Recognition.

Data Analytics
Government Expenditure;
Cash Management;
Government Investment.

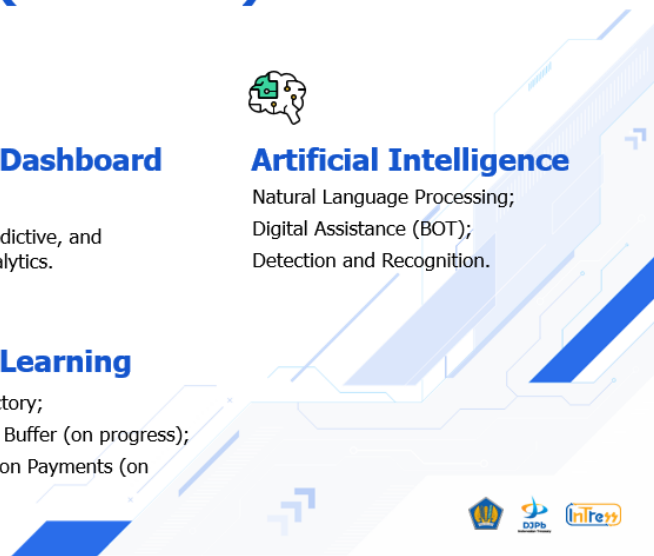**Machine Learning**
Revenue Trajectory;
Optimum Cash Buffer (on progress);
Data Labelling on Payments (on progress).

14.   To ensure financial stability and the availability of cash, the Treasury DG has implemented an **Artificial Intelligence** project aimed at supporting cash-management decisions. This initiative was the first AI project in the Ministry of Finance of Indonesia. The simulation system produces projections of revenues, expenditures, and other main budget items based on predetermined scenarios. By changing the value of individual variables, the projections help, for instance, to guide the decision-making regarding the best timing for the disbursement of large amounts of public funds.

Artificial Intelligence

Development Background

The Ministry of Finance is facing challenges in managing government cash due to the complexity of its duties and the abundance of financial data. With manual analysis becoming more difficult, decision-making is impacted, and it's leading to increased uncertainty and risk. Timely and accurate decisions are vital for financial stability and efficient public services, considering economic changes and political dynamics.

Description

A simulation system that can produce projections of APBN realization based on predetermined scenarios. This includes projections of income, expenditure and other main items in the APBN

Objective

Implementing an IT-based treasury system for APBN simulation, facilitating rapid financial data processing and strategic decision support to maximize government cash management efficiency.
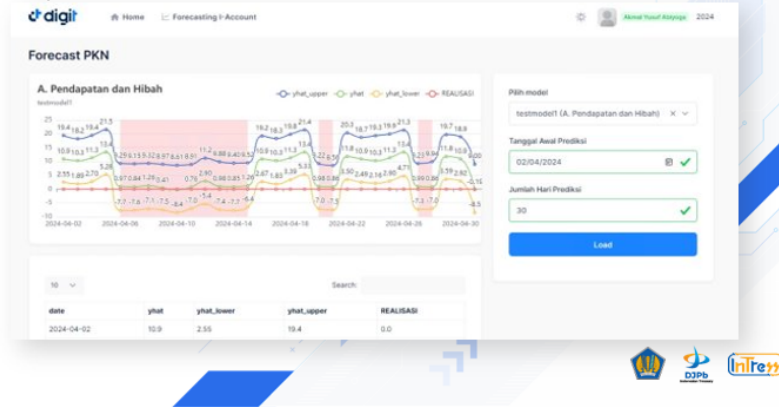

15.   The Asset Liability Committee's Dashboard is an example of a **Data Analytics** project. The dashboard provides flexible access to both actual real-time data and projected data. The projections are based on machine learning and provide useful inputs to decision-making.

16.   The Treasury DG also uses **Machine Learning (ML)** techniques for managing various risks. Thus, the **Financial Distress Pemda** project uses ML to predict the risk of failure of regional governments to repay debts to the national budget based on the existing financial data. A similar approach is implemented for determining the financial capacity of the state-owned enterprises in the framework of the **Early Warning System for State-Owned Enterprises.** Noteworthy, ML models are also used for identifying unusual patterns in the distribution of the **Village Fund**[1] and thus detecting possible fraud in its utilization. In addition, ML is used for identifying anomalies (i.e., the data or events that are unusual or do not match existing patterns) in the Government Payment Platform (PPP) data and highlights such transactions for more detailed treasury control.

17.   In conclusion, **Mr. Zakyuddin** shared the plans for implementing data analytics in treasury operations. These plans include developing an integrated platform that could be also used by the 220 subnational treasury offices, developing a Chatbot using natural language processing (NLP) technology to reduce the burden on staff related to communication on specific disbursement issues, and using computer vision for social media scraping to mitigate the corruption risks among treasury staff.

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[1] The Village Fund comprises grants that are provided by the national budget to the local communities.

Machine Learning
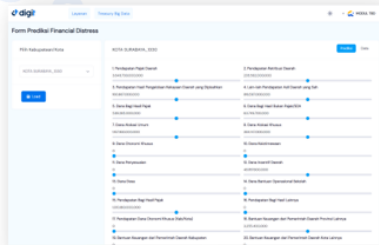
Financial Distress Pemda

Using machine learning as a risk mitigation effort in predicting debtor (local government) failure to pay. The user selects the name of the Province/City and then adjusts the existing financial components so that the user can predict whether the debt can be paid or not

Early Warning System For State-Owned Enterprise

Platform to determine the payment capacity of state-owned enterprises as a step to prevent payment failures of state-owned enterprises.

Discussion

18.   **Mr. Nazim Gasimzadeh, Director of the State Treasury Agency, Azerbaijan** acknowledged the significant progress that the Treasury of Indonesia made in implementing data analytics in treasury operations. He asked a question whether this initiative was driven more by operational necessity or by the desire to lead in implementing the advanced technologies. **Mr. Zakyuddin** explained that both innovation drivers played a role and while some projects were developed based on the requests from the functional departments of the treasury, others were technology-driven.

19.   **Mr. Bariş Can, Deputy Director General, Ministry of Treasury and Finance, Türkiye** noted that while the Ministry of Treasury and Finance in Türkiye is also trying to use AI for treasury cash forecasting based on historical data, colleagues from Indonesia are ahead in this regard. He emphasized that it is critical to use the correct data to get accurate results from the simulations and asked a question about the current practice of using AI for cash forecasting in Indonesia and the plans in this area.

20.   **Mr. Zakyuddin** noted that since most of the data used for the AI models comes from FMIS, the data quality is quite high. He also explained that currently three AI-based models based on various algorithms are used for predicting cash flows. These models use historical data spanning for about 10 years and the accuracy of predictions varies between 80 and 85 percent. The objective is to further develop these models to reach a 95 percent accuracy level. Mr. Zakyuddin also pointed out that a deep understanding of the business process needs is critical for the successful implementation of AI and the overall digital transformation of treasury operations.

21.   **Ms. Mimoza Pilkati, Director of Treasury Operations Department, Ministry of Finance, Albania** expressed her gratitude for the interesting presentation delivered by the Treasury of Indonesia. She agreed that using AI for early warning in cash management and cash forecasting had significant potential.

22.   **Mr. Cem Dener, Lead Governance Specialist & Chair of the World Bank FMIS COP, World Bank** pointed out that data analytics and the use of AI are the cutting edge areas for the digital transformation of treasury operations. While many countries have had FMIS for decades, for the past few years, and especially after the COVID pandemic, the interest in using the data is growing drastically. However, he also warned the participants to be very careful and not to overpromise when they implement AI-based solutions. For instance, one of the technical challenges of implementing reliable ML-based models is related to creating a training sample for the model to get trained and produce accurate predictions.

23.   **Ms. Elena Nikulina** agreed that there are many challenges related to implementing advanced digital technologies and capacity issues are among those important aspects for many countries.

Discussion of 2024 TCOP Draft Annual Plenary Agenda

24.   **Ms. Elena Nikulina** informed the participants about the ongoing preparations for the 2024 Annual Plenary Meeting in Belgrade. To date, 56 TCOP members from 16 member countries (including Serbia as a host of the meeting) have confirmed their participation in the event. Also, the representatives of the Indonesia Treasury DG are expected to participate in the plenary, and a remote participation of the representatives of the **Korea Fiscal Information Service** is envisaged. Participation of representatives of the Financial Department of Rajasthan, India as guest speakers, is also being explored.

25.   **Ms. Elena Nikulina** presented an overview of the 2024 TCOP Draft Annual Plenary Agenda distributed to the meeting participants before the videoconference. The first day of the plenary will be devoted to learning about the experience of the Treasury Administration of Serbia and will include both presentations by the host country representatives and group discussions of the Serbian treasury experience.

26.   On the second day, the discussions will focus on expanding treasury services to spending units. Mr. Mark Sillins will make a presentation about the direct and indirect models of spending units' access to FMIS and highlight pros and cons of these approaches. Then Ms. Sandra Vraneš will present the Serbian experience of including the indirect clients of the Ministry of Education in the budget execution systems. The presentations will be followed by the country cases from the Treasury of Georgia and the Treasury of Albania. Ms. Nikulina offered other PEMPAL members to present their country cases in this area.

27.   **Mr. Nazim Gasimzadeh** noted that Azerbaijan planned to modernize its portal for the spending units and confirmed that the delegation of Azerbaijan would present Azerbaijani experience in this regard.

28.   **Ms. Elena Nikulina** informed the participants that the group discussions on the second day would focus on country experiences in providing treasury services to the spending units. To that end, a separate request to all the participants to prepare short presentations (up to 10 minutes) would be circulated in the middle of May.

29.   The discussions on the third day will focus on enhancing the analytical and reporting capabilities of national treasuries through the application of modern digital tools. **Mr. Cem Dener** would frame the discussions by providing an overview of the global developments in the area of treasury digitalization. Also, the presentations of guest speakers (from Korea and Indonesia) as well as the presentation of the Hungarian State Treasury are included in the agenda. **Ms. Elena Nikulina** called for any ideas that the participants could have about the questions for the small group discussions and noted

that the DARA methodology presented by colleagues from Indonesia could be one of the possible sources for such questions.

30.   On the fourth day, news and updates from PEMPAL countries will be discussed. To this end, **Ms. Elena Nikulina** pointed out that the plenary was of great interest to the representatives of the Ministry of Finance from North Macedonia currently working on IFMIS development. She suggested that the delegation of North Macedonia could make a presentation on their achievements and plans in terms of the IFMIS development.

31.   **Mr. Bari Iseni, Head of Treasury Department, Ministry of Finance, North Macedonia,** confirmed that the representatives of North Macedonia would make a short update on the IFMIS development.

32.   **Ms. Elena Nikulina** referred to the welcome note made by **Mr. Erekle Gvalagze** and highlighted that the preparation of the PEMPAL Strategy for the upcoming five years (2026-2030) was underway. To seek the views and ideas about the focus of the long-term vision of the TCOP activities and the questions relevant for discussions in the next fiscal year, the Secretariat will distribute a thematic survey to all TCOP Members in the middle of May. Only one response to this survey from each country is needed.

Concluding Remarks

33.   **Mr. Mark Sillins** commended the presentation delivered by the Treasury of Indonesia and expressed hope for further productive discussions on the use of technology in treasury operations at the plenary meeting in Belgrade.

34.   **Ms. Elena Nikulina** stressed once again the importance of digital technologies for the future operations of national treasuries. She thanked everyone for the productive discussion and thanked the interpreters for their support during the meeting.

Key Conclusions

35.   **The experience of Indonesia demonstrates that data analytics tools may be used to raise the effectiveness of various treasury functions and go beyond management dashboards and pre-defined reports.** Based on the requests from functional units, benchmarking with other countries and institutions, data analytics competition among staff, and internal workshops, some 150 potential data analytics use cases were identified. Thus, AI-based models can improve cash management and forecasting quality, ML can help identify data patterns to improve debt management, strengthen treasury control, and enhance risk management, while computer vision could support anti-corruption efforts.

36.   **Successful implementation of data initiatives calls for high-level commitment and active engagement of treasury staff**. In the case of Indonesia, the long-term vision of the Ministry of Finance as a data-driven organization as well as significant efforts invested in raising staff awareness about the potential offered by the new data analytics techniques have been instrumental in achieving impressive progress in using data analytics within a short time.

37.   **Introducing data analytics in treasury operations faces technical and organizational challenges and calls for a systemic approach to implementation.** To identify the challenges related to the implementation of data analytics in the Ministry of Finance context, the Bank has developed a Data Analytics Readiness Assessment (DARA). The DARA approach briefly presented by Mr. Daniel

Ortega Nieto, Sr. Public Sector Specialist, World Bank, entails the analysis of 6 broad domains (Demand and Supply for Data Analytics, Data and Data Management, Data Analytics Techniques, People and Culture, Technology, and Organization and Regulation) and helps to identify the key factors that enable or hinder the implementation of data analytics and develop a roadmap for improving the use of data. DARA was piloted in the Indonesian Ministry of Finance, and once the project is completed, the instrument will be published for possible use in other countries.

38.   **The TCOP member countries expressed high interest in using data analytic tools.** To date, several countries, including Hungary and Serbia, use data warehouses to provide flexible access to real-time financial data. Türkiye uses AI models for cash forecasting purposes. The experience in using data analytics in treasury operations and the prospects in this area will be further discussed at the upcoming TCOP Annual Plenary Meeting in Belgrade.