



## TREASURY COMMUNITY OF PRACTICE

### **Joint Videoconference of the Korea Public Finance Information Service and the PEMPAL Treasury Community of Practice (TCOP) Thematic Group on the Use of Information Technologies in Treasury Operations**

November 18, 2021

On November 18, 2021 the PEMPAL Treasury Community of Practice (TCOP) held a videoconference (VC) of the thematic group on the use of IT in treasury operations to learn about the operation of the Korea Public Finance Information Service (KPFIS), the history of dBrain information system and expected capabilities of its next generation. The meeting was attended by more than 54 TCOP participants<sup>1</sup> from 11 PEMPAL countries (Albania, Azerbaijan, Belarus, Georgia, Kazakhstan, Kosovo, Moldova, Russian Federation, Turkey, Ukraine and Uzbekistan). More than 34 observers from the Hungarian State Treasury and the PEMPAL Internal Audit Community of Practice also joined the session. The meeting was facilitated by the World Bank resource team comprising Ms. Elena Nikulina (TCOP Resource Team Leader), Ms. Yelena Slizhevskaya (TCOP Advisor), Ms. Ekaterina Zaleeva and Ms. Galina Kuznetsova (PEMPAL Secretariat).

#### **Summary of discussion**

**The videoconference was opened by Ms. Elena Nikulina, the TCOP Resource Team Leader.** Ms. Nikulina welcomed the participants and thanked the KPFIS for the readiness to share their experience with the TCOP. She reminded about the 2015 TCOP study visit to Seoul during which a small group of the TCOP members learned about the design and operation of the current version of Korean public finance information system dBrain. Ms. Nikulina noted the virtual format of today's event allows to connect a larger group of participants which is an advantage and indicates strong interest to this session because dBrain is known to be one of the most advanced financial management information systems in the world given its coverage, functionality and the level of integration. For many of the countries this is a long-time inspirational goal and this session will illustrate how the system is being improved further.

**Mr. Andrei Narchuk, Director of the Data-Processing Center of the Belarus Ministry of Finance and the co-leader of the TCOP Thematic Group on the Use of Information Technologies in Treasury Operations,** welcomed the participants on behalf of the TCOP members and thanked the KPFIS speakers for this rare opportunity to learn from them. He shared that during the 2015 study visit the TCOP members were impressed not only by the system and its capabilities, but also by the country's approach to implementing public finance management reforms which form the foundation for such information systems. Nowadays we live in a world of digital technologies, which are not an output, but a prerequisite for reforms, so we are looking forward to hearing of the latest developments in dBrain.

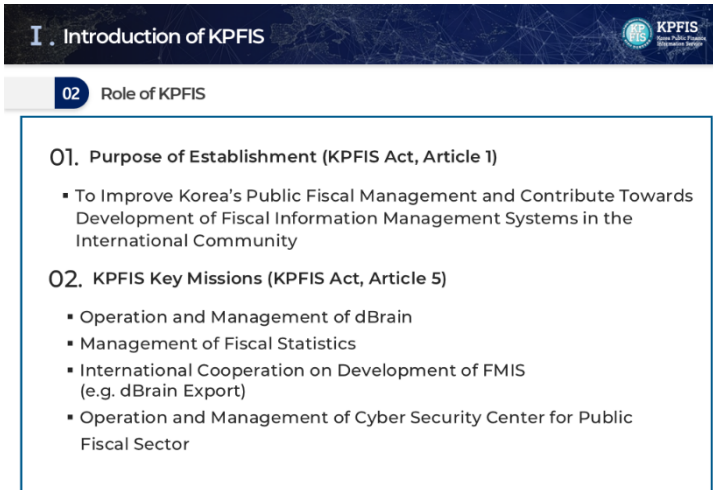
---

<sup>1</sup> The number includes only those who provided full contact details



**Ms. Myoungja Kim, the Head of Department of dBrain Operations**, welcomed the participants on behalf of the KPFIS and thanked the PEMPAL TCOP for organizing this knowledge sharing event. Ms. Kim noted that with COVID-19 pandemic the KPFIS committed themselves to ensure safe and secure operation of Korea public financial management information system dBrain. The dBrain is in operation for 14 years already, and the next generation dBrain will become operational starting 2022. It is expected that it's integrated core PFM modules, interfaces with other government systems and AI-based decision support, performance monitoring and reporting platform are going to bring a lot of convenience to the general public. In the next generation dBrain the KPFIS is going beyond its existing role as the system will be used as a policy assistance tool. Ms. Kim expressed her hope that the next generation dBrain and dBrain's contract management features prove useful for many participants. She wished this videoconference to become a cornerstone for future cooperation between the KPFIS and PEMPAL member countries.

The first presentation was delivered by **Ms. Hanwool Oh, Associate in the Technical Consulting Division of KPFIS**, and served as an introduction about the KPFIS and on how to cooperate with KPFIS. It was explained that until 2016 the public financial management information systems were supported by outsourced private IT companies and supervised by the Ministry of Strategy and Finance, this function was transferred to KPFIS in 2016 which was established as a public organization (see the slide for the roles of KPFIS). Knowledge sharing on dBrain and Financial Management Information Systems (FMIS) is one of the tasks of



**I. Introduction of KPFIS**

**02 Role of KPFIS**

**01. Purpose of Establishment (KPFIS Act, Article 1)**

- To Improve Korea's Public Fiscal Management and Contribute Towards Development of Fiscal Information Management Systems in the International Community

**02. KPFIS Key Missions (KPFIS Act, Article 5)**

- Operation and Management of dBrain
- Management of Fiscal Statistics
- International Cooperation on Development of FMIS (e.g. dBrain Export)
- Operation and Management of Cyber Security Center for Public Fiscal Sector

KPFIS. Ms. Oh explained that this includes (i) provision of consulting services on the establishment and modernization of financial information systems based on requests from the countries, and (ii) Knowledge Sharing Program (KSP) under the auspices of the Ministry of Economy and Finance under which Korean experts provide customized policy suggestions to partner countries based on Korea's economic development experience and knowledge.

The second presentation of the session was delivered by **Mr. Ki-Young Lee, Manager in the Technical Consulting Division of KPFIS**, who shared brief history of dBrain and the D.N.A (Data, Network, Artificial Intelligence) of the next generation dBrain.

The current Korean Integrated Financial Management Information System (dBrain) was established in 2007 by consolidation of the financial management information systems of the central ministries, departments and agencies. dBrain was adopted to support implementation of major fiscal reforms, including adoption of 5-year Medium-Term Expenditure Framework, introduction of the top-down and program budgeting, as well as accrual-based double entry accounting, and manages the entire process of public financial management (see the slide below). The system is interconnected with 49 institutions and 85 systems of the government for real-time fiscal management. Consolidation of all the government accounts in dBrain resulted in higher satisfaction and fiscal data utilization by all categories of users, including general public, National Assembly, line ministries and fiscal authorities.

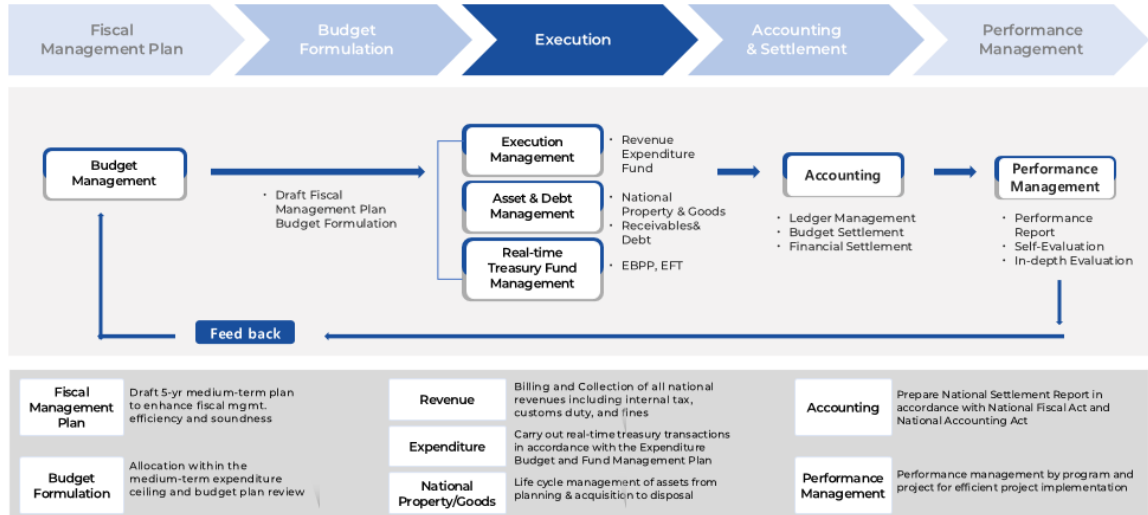


# I . Current Korean FMIS



## 01 Korean Central Government's FMIS : Functions & Modules

### Manage the entire processes of public finance management



- 7 -

Mr. Lee further explained the need for the upgrade of the current version of dBrain: it does not support multi-tasking, has small screen size, is hard to install, slows down when processing large volumes of information, is only available during operating hours on working days and is unable to apply latest ICT, such as Big Data and AI. Information System Master Plan for the next (4<sup>th</sup>) generation dBrain was developed during November 2017 – April 2018, development of the system began in September 2019, construction and unit testing – in September 2020, the system was partially opened in May 2021 with full opening scheduled for January 2022, another 3 months (till the end of April) are reserved for system stabilization.

The next generation dBrain performs 24 tasks, with 13 reconstructed tasks and 11 new tasks (6 of them relate to project management - liability amount, bond, contributions, loan, private investment, income outside of tax; and 5 to statistics - government debt, Government Finance Statistics, finance estimation, finance management expansion). It was noted that expansion of the system from 49 to 807 entities (including central organizations, local governments, educational institutions, public institutions, etc.) and provision of the real-time information connection will enable automatic calculation of integrated financial statistics needed to make policy decisions.

The speaker explained that the next generation dBrain is a user-centred system based on reorganization of data management principles, policy, and organization to aid systematic and efficient utilization of big data of various areas. Interconnection of the finance & macro administrative indicators in the system lays the ground for integrated fiscal information analysis (see the slide below for more details).

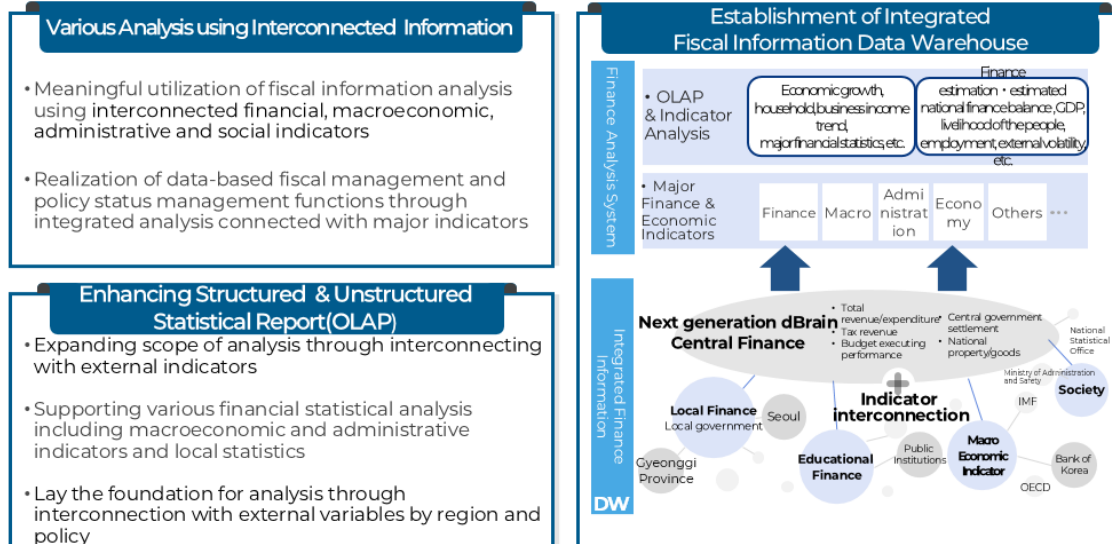


### III. D.N.A.(Data, Networking, AI)



#### 03 Interconnection of Finance & Macro Administrative Indicators

Lay the groundwork for integrated fiscal information analysis



There are three main areas in dBrain where artificial intelligence (AI) will be utilized, namely:

- to prepare treasury balance forecast with a goal of supporting the establishment of revenue / spending and financing plans through machine learning and deep learning;
- to prepare Gross Domestic Product estimates aiming to observe economic fluctuations at very short cycles (weekly economic index) or updating forecasts in real time, and analyzing the effects of external shocks;
- 24/7 user support desk using AI chatbot.

**The presentation was followed by a rich question and answer session.**

- **Mr. Andrei Narchuk opened the session with questions on user management and how exactly the citizens can access the system.** The KPFIS team<sup>2</sup> clarified that out of the total 65,000 users, concurrent users comprise about 25%. Users also have different level of access authorization and perform different tasks, with some of them having seasonal patterns (like budget formulation, preparation of end-year final accounts, etc.). This spreads out the load on the system. There are also standards of data connection, and KPFIS monitors data connection between the dBrain and 85 external agencies to make sure that when data is generated it is shared correctly. Digital recovery system is also in place to ensure that there is no interruption in dBrain connection. Regarding citizens' access to public finance information, it was explained that there are multiple ways for the public to do it, one of the options is through "Open Financial System" which is a subsystem of the closed dBrain system; it contains budget figures and final accounts accessible to general public.
- **Ms. Galina Kuznetsova (World Bank)** asked whether the deployment of AI will decrease the number of staff. The KPFIS team commented that indeed there are plans to augment the

<sup>2</sup> Including the speakers as well as Mr. Paul Nam, Senior Manager in Technical Consulting Division of KPFIS



user service center with AI technology, but as of now this does not impact the number of staff in the call center.

- **Mr. Nazim Gasimzade, the Head of IT Department in the State Treasury of Azerbaijan, raised a question of moving from commercial to open-source databases.** The KPFIS team shared that indeed they had reviewed open-source options, but it was decided that the current and the next generation dBrain will not use them. The reason was that the IFMIS is a very critical state system and currently available open-source options had not satisfied the system requirements. It was nevertheless noted that the KPFIS will continue monitoring the open-source options.
- **Ms. Elena Nikulina (World Bank) asked about the innovations embedded in the next generation dBrain, including treasury balance forecasting and the methodology applied.** The KPFIS team clarified the next generation dBrain will have AI-enabled estimation capability. The system will have real-time data on external factors which will allow to have more accurate estimation of the future impact on the fiscal balance. The system will monitor the changes and economic fluctuations in the short cycle and assess the impact of these shocks. Machine-learning technologies will be used to produce the estimations.
- **Mr. Ilyas Tufan, Deputy Director General of the Debt Office of the Ministry of Treasury and Finance of Turkey, was interested to learn about performance reports on cash and debt management that the system will produce.** The KPFIS team explained that their goal is to come up with the best optimal customized forecasting model for Korea. It was mentioned that the original module is not an optimal one yet, the current data and the future data will be used in the training algorithm embedded in the system, so the model will evolve over time. There are some reports defined but they may change in the next generation dBrain. It was clarified that tax revenue and GDP estimations will be implemented first, debt management will come after.

The last presentation of the session was delivered by **Ms. Ji-Hye Kim, Manager in Execution Information Division of the KPFIS**, who explained the contract management processes in current dBrain. The speaker had set the stage by explaining the definition of a contract (procurement), main types of contracts, as well as the three methods of contracts in use in the country - e-contracts that are concluded through KONEPS<sup>3</sup>, contracts concluded in writing, as well as cases of omission of contracts when a state is a party<sup>4</sup>. Main milestones of the contract management and internal and external interconnections with different systems were explained to participants in detail (see illustration on the slide below). Ms. Kim further presented the work processes from a contract to expenditure and the stages of a contract processing by the dBrain and KONEPS. Wrapping up the presentation the speaker highlighted the benefits of electronic contracts which include elimination of unnecessary doubts and cases of corruption which are inherent to face-to-face conclusion of the contracts, and improvements in procurement efficiency and reduced administrative costs through convenient storage and management of contracts by the systems.

<sup>3</sup> Korean on-line e-procurement system

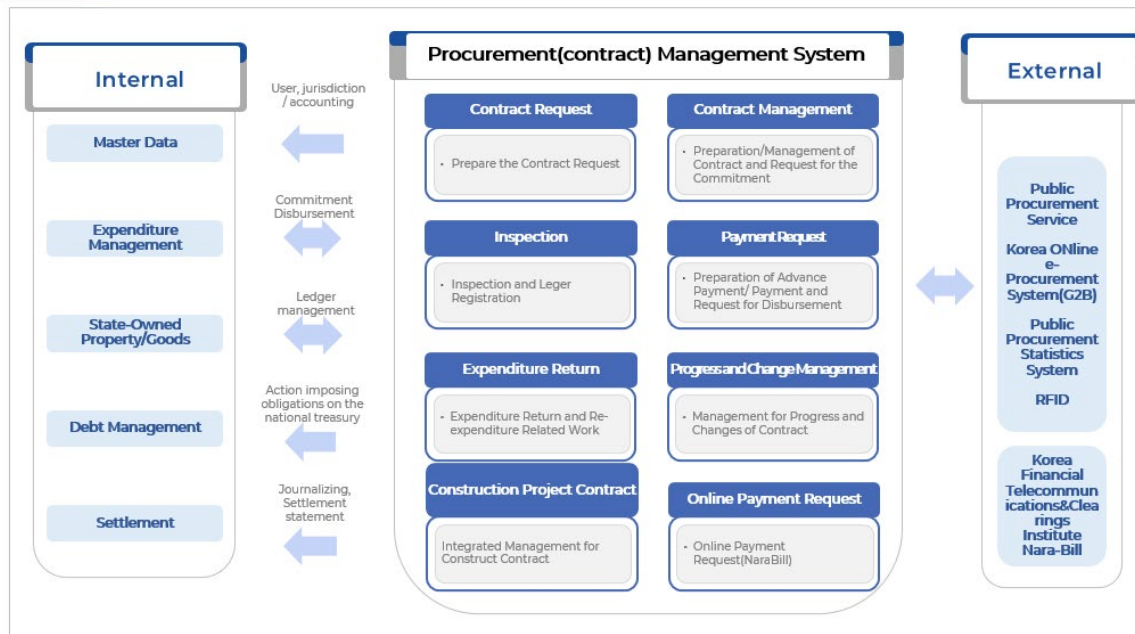
<sup>4</sup> Contracts less than 30 million won (approximately USD25,000)



## IV. Interconnection



### Internal and External Interconnection for Contract



The presentation stirred a lot of practical questions from the participants:

- **Ms. Yelena Slizhevskaya (World Bank)** asked **whether contract drafting is automated in dBrain**. The speaker clarified that depending on the type of contract the user selects the system will offer different predefined fields to fill in. There are also some mandatory fields that need to be populated (like the type of budget to be used).
- **Mr. Andrei Narchuk** was interested to know **whether it is convenient for the user to work with both KONEPS and dBrain**. It was explained that a user can use both systems simultaneously. Connection between the systems is done very quickly, close to real time – once the contract is being send from KONEPS the dBrain user can see it in the system in 1-5 minutes.
- **Ms. Elena Nikulina** commented that **achieving such level of integration between the two systems is a goal for many of the TCOP countries, her further question touched about the institutional set up of the systems**. The speaker shared that public procurement service is a separate government agency responsible for government procurement, therefore it is a separate agency since the bidding process needs to be separated and independently managed. dBrain is used for budgeting and contract execution, so all budget related issues are performed by dBrain. E-contracts are concluded electronically between the government and ordinary vendors, these are signed through KONEPS. There also are so called “dBrain contracts” – they are not done electronically, but their data is electronically managed, and this is the main difference between the two types of contracts.
- **Ms. Lyudmila Guryanova, the Deputy Head of the State Treasury of Belarus, clarified how written contacts return to dBrain and how the signed contracts are stored**. Ms. Kim shared that there is a standard that defines what information should be shared between the KONEPS and dBrain (different types of contracts, inspection and examination results, and other information from the whole life cycle of a contract), this was agreed based on



negotiations between the agencies. On a regular basis data from KONEPS will be retrieved, stored in a database and processed for the use by dBrain. There is a regular monitoring system in place to ensure uninterrupted flow of data between the systems. There are other external systems, and the same negotiation process was applied to determine what information to exchange between those and dBrain. Responding to the follow up question on electronic contract it was clarified that the dBrain stores information on e-contracts, but the owner of the information is still KONEPS and, once modified, the contract information will be modified withing KONEPS and then sent to dBrain so both sides have up to date information. There are also contracts that are executed in dBrain, and for such contracts the information will be entered in dBrain and the owner of the information will be dBrain.

- **Ms. Mimosaa Pilkati, Director of the Treasury Operations Department of the Treasury Directorate of Albania, clarified whether dBrain contracts (commitments) are automatically monitored against daily/monthly cash flows forecasting data.** When requesting a contract, it is needed to define the budget that will be used. Then automatically one can generate information for the commitment entry. The autogenerated data will be verified by a person in charge and you approve that commitment then you could link it to KONEPS. Only then the budget could be spent. There is auto generation of a commitment, but a manual confirmation and verification process.

Wrapping up the session of KPFIS presentations **Mr. Paul Nam, Senior Manager in Technical Consulting Division of KPFIS**, shared that he felt that the TCOP members were very keen to know about current and future dBrain as evidenced by so many questions received. We do not call it an online conference, but rather online customized consulting session, we will be happy to learn about the challenges you are facing so we could improve and suggest how to modernize IFMISs. KPFIS was established in 2016 and is keen to share knowledge and experience of the Korean IFMIS. Mr. Nam invited the participants to contact the KPFIS with additional questions as needed, or to turn to KPFIS consulting program for further support. Mr. Nam noted that this videoconference is a first step in collaboration between PEMPAL TCOP and KPFIS.



In his closing remarks **Mr. Narchuk** shared his appreciation for this interesting event that connected participants from 10 time zones and was a success both in terms of information shared, and in terms of the level of interactions. The discussion proved that the countries face similar issues, and that the state-of-the-art technologies implemented in the new generation dBrain is likely to prompt new solutions in the use of information technologies for the treasury operations. Mr. Narchuk noted that the users of different services have to deal with the advent of AI, which is used in data warehousing, forecasting, modelling, and these are the topics to discuss by the thematic group in the future since humans are no longer able to process the amounts of information they are facing.

Closing the session **Ms. Elena Nikulina** thanked the speakers and the participants for the excellent contributions to the session. In her role of a leader of the resource team Elena was particularly happy to hear that the KPFIS team sees the event as a first step in collaboration with the PEMPAL Treasury Community of Practice and the resource team will additionally follow up with KPFIS on the format of potential collaboration.

