IFC Satellite Seminar on "Post-crisis data landscape: micro data for the macro world", co-organised with the Central Bank of Malaysia and the European Central Bank

16 August 2019, Kuala Lumpur, Malaysia

# Data management in the data evolution era at Bank of Thailand[1]

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[1] This presentation was prepared for the meeting. The views expressed are those of the author and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

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## Abstract

At present, Thai economy rapidly changes and faces with Volatility, Uncertainty, Complexity and Ambiguity (VUCA) environment. At the same time, these cause the proliferation of data sources, in particular, the surge in demand for new data and profound analytics. To implement a policy more efficient, traditional data may not adequate for Bank of Thailand (BOT) to make a policy decision. Therefore, the BOT has adjusted and paved the way for reaching to the economic challenges by setting direction and scope in the BOT 3-year strategic plan (2017-2019). For data management area, the BOT increases in capacity to analyse data at micro level and to make a greater use of high frequency data from various sources in order to complete more coverage of economic situations. The main objective of this paper is to portray the current state of data management at the BOT under the data evolution era. The BOT has made consideration efforts to improve the internal data management. Consequently, more granular data is an evolution for timelier and richer policy analysis in this time. One of the BOT's studies uses corporate loans to study the information-based lending instrument to make its standards viable. Nowadays, various important data are obtained from both government and private organizations. The BOT has collaborated with various organizations because the data and the academic cooperation are provided appropriately to meet the needs and benefits for the mutual organization. However, micro data has an enormous potential to help policymakers overcome several constraints while also create challenges at the same time. In particular, the data also contains confidential information on the individual, therefore, it should balance between usage and protection of the data as well as comply with data protection law of the country including international standards.

Keywords: data management, data collection, micro data

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# Contents

# 1. Introduction

In the VUCA world of high Volatility, Uncertainty, Complexity and Ambiguity, economic environment has changed dramatically. Corresponding to the world of SMAC which stands for Social, Mobile, Analytics and Cloud, it also completely changes pattern of individual behaviours. Moreover, the transformation could bring about a shock transmission spread more easily throughout the world. Therefore, the evolution has developed globally and the organizations both private and government sectors have to shift an economic evaluation into various dimensions which gives the new growth of opportunities and challenges.

There has been a notable rise in the volume and variety of data which brings the difficult to grasp such a new economic activity by conventional measures. So, an analysis is developed to ensure insightfulness and deeply understanding of the evolution from conventional to unconventional analysis. Data is changed from structured to unstructured data. Methodology and tools level up from macroeconomic models to machine learning to support data analytics in the transformative world. The integration of demand and supply of the data could make an analysis more efficient in terms of deeply and widely analysis which develops from macro to micro view in order to understand individual behaviours and support evidence-based policy. However, these lead to a question that how the data management will develop in the age of disruptions. Then, this study proposes to show the current state of data management at Bank of Thailand consisting of strategic direction of organization developing to support structural reform of the economy. In addition, the paper provides the linkage between supply and demand of data which shifts from analyzing the conventional to unconventional way. Finally, the study portrays the challenges of data coming with the age of data evolution.

# 2. Data Management in Data Evolution Era

## 2.1 BOT 3-year Strategic Plan

The BOT 3-year strategic plan comprises of 12 strategies grouped into 3 dimensions (figure 1). The main pillars contain stability, development and internal excellence. The stability of the economy and the financial system is the BOT's core mandate. The development of financial sector is provided to help to promote sustainable and inclusive growth towards digital economy. Finally, internal excellence is a critical foundation and enables both stability and development to functioning efficient.

Figure 1: BOT 3-Year Strategic Plan (2017-2019)
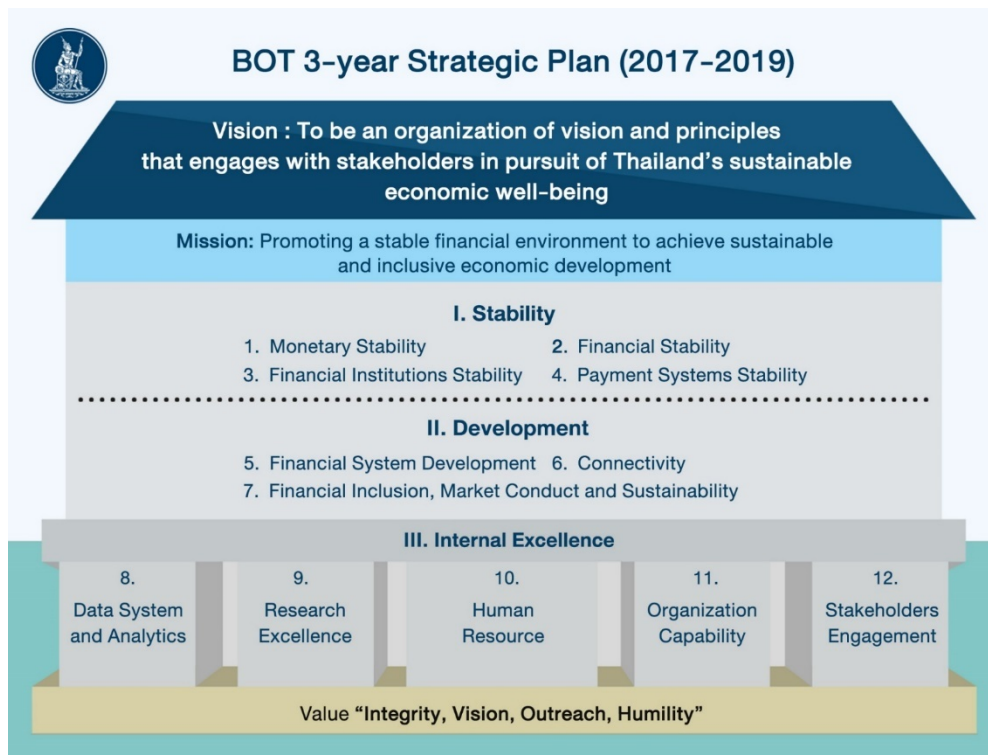


Source: Bank of Thailand

Along with the BOT's strategic plan, the Data Management Department (DMD) also has a plan to support the organization. Firstly, the BOT will enhance capacity on data analytics, especially through the use of micro-level data to complement aggregated data and understanding structural adjustments and managing the organization. Moreover, the BOT will implement the data governance organization-wide including Data Leak Prevention (DLP). The data governance process helps to enhance proper data collection, analysis of data and enhancing further innovative use of data. Secondly, the DMD will acquire new data and improve existing data to meet user requirements and ensure the high-quality of data including timeliness and adequacy of data from various sources. Thirdly, the BOT will widely-make use of data, especially financial and economic data for creating and developing data and statistic indicators, including academic research. Lastly, the BOT will encourage academic cooperation of various organizations in order to set public data bureau in financial and economic data and contribute data sharing as well as create a data standard of country.

## 2.2 Data Collection Framework

Data in Bank of Thailand is collected in several kinds both traditional and non-traditional data. However, the main sources are financial and non-financial institutions as well as could be separated into four areas consisting of financial institution data, financial market data, payment data and economic data. All of the data are provided to serve financial and economic stability, statistic purposes and monetary policy formulation including financial markets, financial institutions and supervision. For data collection legislation, we abide by the laws and regulations

consisting of Bank of Thailand Act B.E. 2485 (1942), Financial Institution Business Act B.E. 2551 (2008), Exchange Control Act B.E. 2485 (1942) and Payment System Act B.E. 2560 (2017). There are various types of data collecting in central bank such as regulated data and data from collaboration, Memorandum of Understanding (MOU), internal data and public data. In addition, there are other data which are also collected from public bodies and private companies in order to complete coverage of data and meet users' needs such as administrative data and survey data.

In the digital world, new data are created every day, therefore, the collection is transformed to next generation of data including big data to monitor economic and financial stability, statistics proposes and policy analysis. There are various types of unconventional data such as micro data and big data acquiring in respond to rapidly change in society and gain wider and deeper insight into individual behaviors and social patterns. They also complement and expand data that are collected conventionally. However, the data in the organization is usually collected separately. Therefore, to operate and manage the data efficiently and complete the high quality of data, the technology of integration platform should be provided to support the process of validating, cleansing and linking data from different sources in order to enhance data usage in many aspects. However, we try to create more value of data by linking between data points from various data sets through the platform, namely individual data integration system (IDI). For example, there is linking between loan data and export-import data in order to complete an analysis in the new structure of economic situation. This integration could help to encourage analyzing data from various sources with many aspects and more profoundly. Regarding the data is in form of the micro data and transactional base, then, data anonymisation and data masking are implemented ensuring the data privacy and security protection.

## 2.3 Micro Data Usage

In response to rapid changes, the BOT have to upgrade analysis by using the micro data which can both directly and indirectly benefit to macroeconomic analysis. This is a way of change from conventional to unconventional analysis in order to fill the data gap and increase the usage of micro data together with the use of new data analytics techniques. These, in turn, help to support the needs of statistical data for analysis aligned with the data strategic plans as well as elevate the quality and standard of the statistical data in a new economic landscape.

Basically, an analyst usually starts with a financial balance sheet in order to monitor asset and liability of financial sector. However, this is not enough for policymaker to make the policy decision. This is the reason why the organization has to use micro data for macro analysis. An information-based lending measure is implemented to better access of financial resources. Pinthong et al. (2018) studied corporate debt-level data and found that a revenue-based lending has limited access to bank loans of SMEs, especially new firms, low value fixed assets firms and low income revenue firms. Therefore, we allow financial institutions to use of alternative data in addition to income such as mobile data usage, utility usage and bill payment in determine the ability to pay of the borrowers which provides the greater benefit of financial access to SMEs. Moreover, according to credit bureau

data, the results from the study of Chantarat et al. (2017) also showed that Thais load up on debt at a younger age and owe it longer. This led to implement the regulations on credit card and personal loan to manage household debt of the country.

For property market, the BOT has conventional statistics data to monitor real estate conditions such as construction areas permitted data, Residential Property Price Index (RPPI) and Land Price Index (LPI). However, to capture macro analysis by using only aggregated data may be insufficient, therefore, Dummee and Trongthamakit (2018) incorporated micro data such as electricity usage data to expand the coverage of analysis in real estate market. This analysis can help to monitor bubble in the property market by compiling an occupancy rate from the number of unit in condominium representing real living behaviours of Thai people. In addition, the data also provides benefit for evaluating manufacturing and tourism sector development from electricity usage. Similarly, Samritpiam and Wanitthanankun (2018) applied bulk payment data to construct Employment Revenue Index (ERI) to monitor labor market both trend of number and income of labor for employment conditions.

The BOT also seeks to take advantage of big data which potentially enhances making policy decision. Sawaengsuksant (2018) used Google Correlation to compliment monitoring economic conditions such as consumption, purchasing power, consumer confidence and number of unemployed persons. These information can enhance predictive power of forecasting and supplement the traditional data. Moreover, the BOT also stepped up in analysis by using text analytics in order to support policy formulation and internal excellence. For example, the BOT used text analytics to improve operational efficiency of statistics compilation such as classification of government expenditures and analyze employees' health as well as explore minutes of commercial banks to help understand behavior and culture of the banks. Therefore, this is a way of change how the micro data can serve the policy analysis in the macro world and also make policy better and more efficient in this data evolution era.

## 3. Challenges

Along with the process of acquiring, processing, keeping and using data, there are several challenges must be overcome before we transform into a digital organization. There are three main tasks consisting people, technology and laws and regulations. Firstly, people are a key driver to deliver work and make data speak. Thus, it is necessary to develop analytical skills in order to tackle with the new things both data and tools. For example, data scientists, lawyers, IT specialists should work alongside statisticians and economists in order to fill the gap to each other. To level up capacity of managing and using unconventional data, therefore, collaborating with abundant human skills is an important to work across their boundaries and could take advantage from this age of data. Secondly, technology data platform is preferred to support data management from collecting data until using data both conventional and unconventional data in easy way. The data platform should provide technical options to complete the quality of data in terms of cleansing, validating and publishing. Moreover, the technology platform should support data integration which can combine various data sets particularly granular

data and big data-sets. At the same time, the technology should apply Data Leak Prevention (DLP) to safeguard privacy data and ensure that data is not exposed to anyone who has no right to access it. Finally, laws and regulations directly affect to the data management in the organization such as the Personal Data Protection Act B.E. 2562 (2019), Thailand Cybersecurity Act B.E.2562 (2019), the Digital Government Act B.E. 2562 (2019) and the General Data Protection Regulation EU 2016 (GDPR). Since the micro level data usually contains large amount of sensitive and personal information, any violation of the privacy and confidentiality risks are a major concern. Moreover, data usage is not limited only in the organization or in the country but it can share across country to enhance data usage. If there is insufficiently protected information, the loss of data can lead to reputational damages and loss of trust in the organization. Data governance policy, therefore, is an important role in governing data management and encouraging aware of accountability as well as responsibility to the data usage in the organization.

# 4. Way Forward

Under uncertainty situations, data becomes a significant tool for analysing and making better policy decision. To make the BOT's work smooth and insist on this environment, then, the way forward and preparedness plans are followed. Business use case should be implemented first to acquire new data. This leads us to know what kind of data can serve us and what policy we want to do. If we have the right direction, we will be able to solve problem clearly, meet ultimate goal with timely and take it into practice promptly. It also helps to balance the use between demand and supply of data. Second, data platform should be deployed to operate and manage the data efficiently in terms of capacity, quality and use. Furthermore, Data Leak Prevention (DLP) technology will be used to protect confidential and privacy data in terms of keeping and sharing data as well as to align with the data governance policy. To provide more improving the analytical capacities of the organization, we are studying such a suitable technology to integrate various large micro data from different data sources. Moreover, the technology should support appropriate visibility both masked and unmasked confidential data depending on roles and responsibilities as well as purposes. Third, the BOT implemented Data Governance Policy (DGP) on July 2019, which provides a guideline for proper data management and helps to increase and sustain data governance awareness and accountability at all levels in the organization. Consequently, the BOT is conducting a code of conduct which provides a practical guideline for managing data and to assure that all entities could govern data under the same standard. In the same way, central data registry is prepared in order to centralize and contain all data entities with systematically. It also provides data classification which helps to scrutinize the confidentiality of data and support role-based access control as well as to facilitate effectiveness of data management. Last, data should be fully utilized in the organization including across country. At the same time, the data will be kept securely and confidentially along with compliance with the laws and regulations of the country and international standards. If data is distributed, this could help not only reduce the burden on data providers but also contribute abundant knowledge to each organization and support data ecosystem of the country.

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# Outline

1. Introduction of Data Evolution Era

2. Objective of the study

3. Data Management

4. Challenges

5. Way Forward

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Data is one of the strategic asset and can make many benefits for an organization.



Structured Data

Excel    Time Series Data

Sales    Surveys

Financial Statement

Unstructured Data

Chat    Customer/Member Transactions

Notes & Text Fields    Email

Social Media    Voice Transcriptions

Call Center    Online Communities

★★★★
Ratings & Reviews

Technology

cloudera

hadoop

API
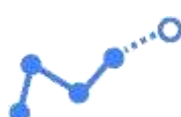Application Programming Interface

Tools

EViews

stata

R    MATLAB

tableau
SOFTWARE

sas

python

Analysis

Analysis Using Micro Level Data
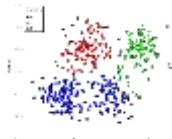
Prediction    Clustering

Text Mining    Network Analysis

# Objective of the study

**To portray the current state of data management**

- BOT's 3 Year Strategic Plan
- The Journey of Micro Data
- Micro Data Usage

**To state challenges associated with data management**

# BOT 3-year Strategic Plan (2017–2019)

**Vision :** To be an organization of vision and principles that engages with stakeholders in pursuit of Thailand's sustainable economic well-being

**Mission:** Promoting a stable financial environment to achieve sustainable and inclusive economic development

## I. Stability

1. Monetary Stability
2. Financial Stability
3. Financial Institutions Stability
4. Payment Systems Stability

## II. Development

5. Financial System Development
6. Connectivity
7. Financial Inclusion, Market Conduct and Sustainability

## III. Internal Excellence

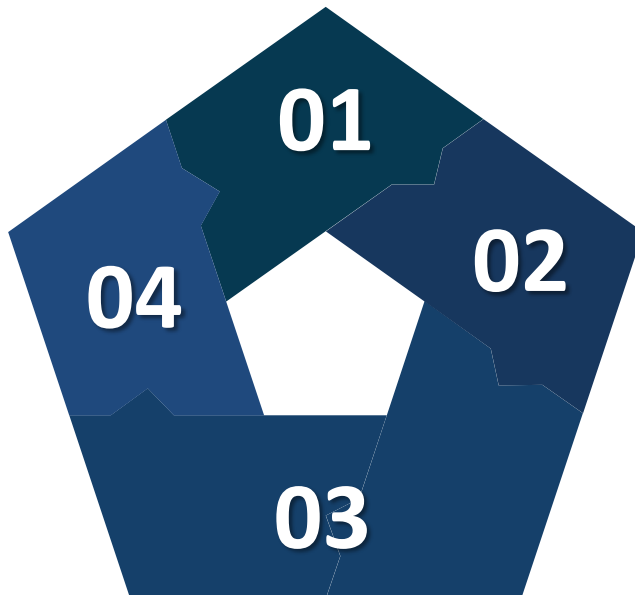| 8. Data System and Analytics | 9. Research Excellence | 10. Human Resource | 11. Organization Capability | 12. Stakeholders Engagement |
|---|---|---|---|---|

Value "Integrity, Vision, Outreach, Humility"

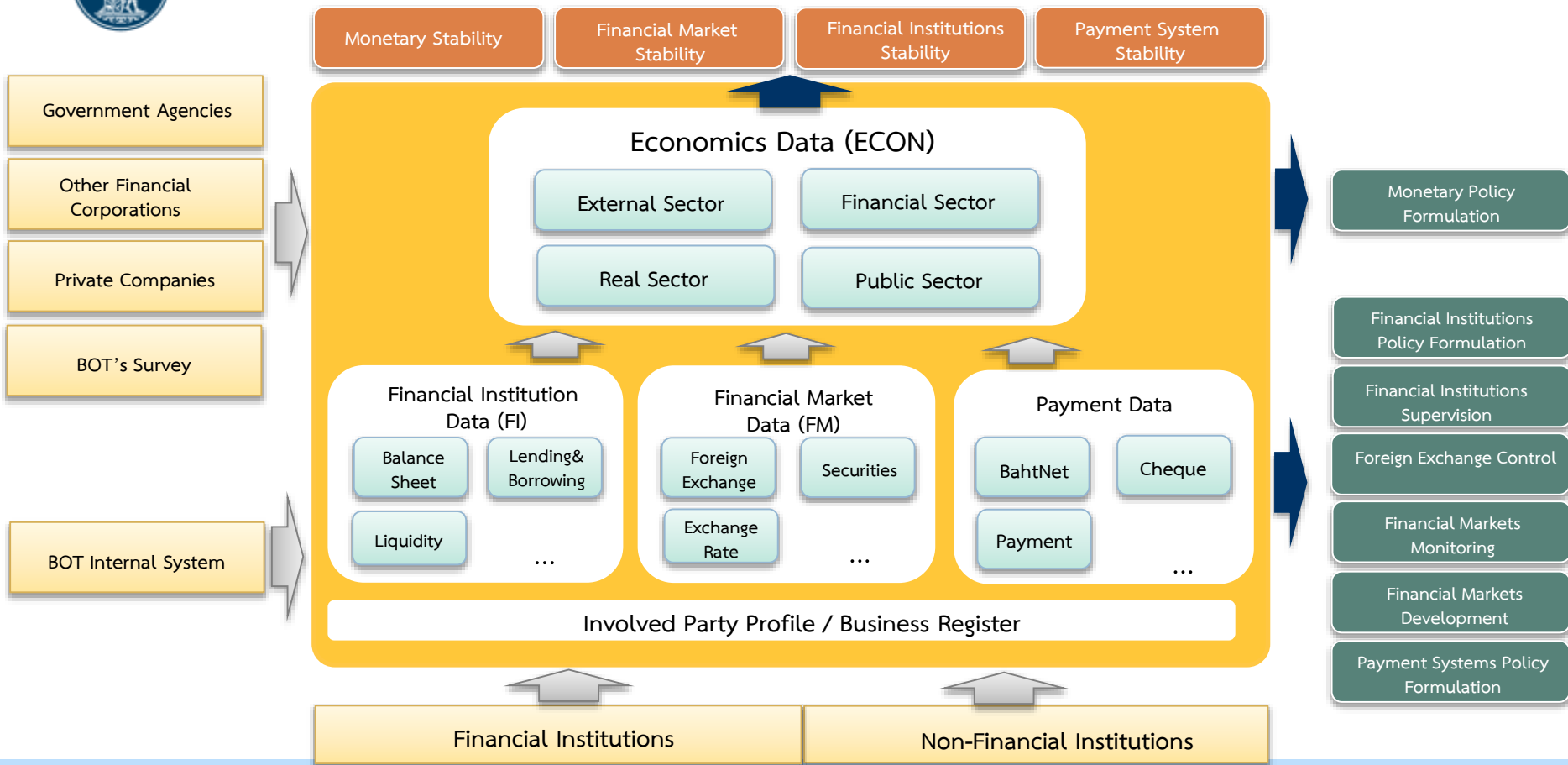1. Enhance capacity on data analytics in assessing economic conditions & to support strategic direction and managing organization

2. Acquire data from various sources especially near real-time data to meet timeliness, adequacy and quality of data

**01**

**02**

**04**

**03**

4. Contribute to set public data bureau in financial and economic data

3. Widely-made use of data, especially financial and economic data

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**Other Data**

- Public data: financial statement
- Buy: Sales Nielsen's FMCG

**Collaborative Data**

- Labor Force Survey (LFS)
- Household Socio-Economic Survey (SES)

**Regulated Data**

- Financial Institution Data (FI): business loan, mortgage loan
- Financial Market Data (FM): FX transanction, securities
- Payment Data: interbank bulk payment

**Next Gen Data**

- Big Data

**MOU**

Economic Data

- Electricity consumption
- Employment data
- Import-export data

Financial Data

- Credit Information

**BOT's Internal Data/Survey**

- Data from BATHNET system
- BOT's Survey: Business sentiment survey, IIP

1  2  3  4  5  6

Analytically changed from conventional to unconventional data and use, which can leverage both directly and indirectly benefit to macroeconomic and financial statistics, and finally policymaking.

## 1 Information Based Lending Policy

- To use corporate debt-level data in analyzing the development and the current situation of corporate debt in the country
- A revenue-based lending has limited access to bank loans of new firms, low value fixed assets & low income revenue firms
- Changing from conventional data to behavioral data: moile data, utilities serives payment for credit approval
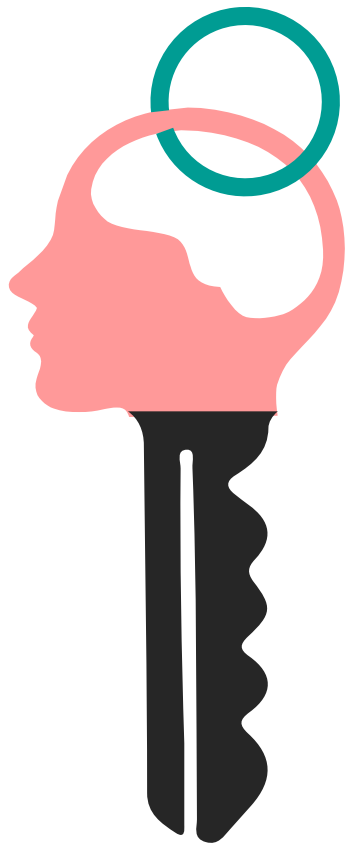- Allows SMEs to better access financial resources

## 2 Property Market Analytics

- **Conventional Indicators**: Construction Area Permitted Indicator, Residential Price Property Index, Land Price Index
- **Using across with unconventional data**: electricity consumption from electricity meter on monthly basis
- To compile condominium occupancy rate in Bangkok and Its vicinity
- In constructing occupancy rate to analyze consumer behavior of real living in condominium and monitor properties market
- Supporting to analyze real estate conditions and tourism from electricity usage data

## 3 Use text analytics to improve operational efficiency

- To classify government expense by code number to support a compilation of public finance statistics
- To analyze health profiles/records of BOT's employees
- To explore minutes of commercial banks using text analytics to help understand behavior and culture of the banks
- To analyze BOT's notifications using text analytics to support RIA (Regulatory Impact Analysis)

Reference: 1. Paweenawat, A., J. Pinthong, K. Samphantharak, and N. Wasi. (2018): "Corporate Debt in Thailand: What We Learn from the National Credit Bureau Data" 2. Knuntip and Jittima (2018) "Condominium Occupancy Rate in Bangkok and Its Vicinity from Electricity Meter Data Analytics" 3. Bank of Thailand Annual Report (2018)

## People

- New Skill Profiles: new (big) data, analytics tools
- Mixed skill: economist, statistician, data scientist, lawyer and business skill
- Capacity: data management and data usage

## Technology

- Acquisition: structured & unstructured data
- Process: cleasing, quality, validation
- Keep: linking data to enhance usage

## Laws and Regulations

- New Data Laws: do not break the laws
- The Personal Data Protection Act (B.E.2562 (2019))
- The Cybersecurity Act (B.E.2562 (2019))
- The General Data Protection Regulation (GDPR) 2018
- Data Governance Policy

# Way Forward

**1** Business Used Cases

- Collaboration demand and supply of data
- To acquire the right data

**2** Data Platform

- Operating and managing: big data, quality, use
- Processing data: masked data vs. unmasked data
- Private cloud storage
- Data Leak Prevention

**3** Data Governance

- BOT's Data Governance Policy
- Improving DG Awareness: accountability
- To have code of conduct applied all units

**4** Data Collaboration

- Data coordinating in and out organization & cross country
- Help reduce burden of data providers

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