IMPROVE THE LIFE CYCLE ASSET MANAGEMENT PERFORMANCE BASED ON THE SYSTEMIC KPI APPLICATION

Li SHEN
State Grid Cooperation of China
shen-li@sgcc.com.cn

Jun TANG
Shanghai Municipal Electric Power Company
tangj@sh.sgcc.com.cn

Wanrong XU
Shanghai Municipal Electric Power Company
xuwr@sh.sgcc.com.cn

ABSTRACT

Establishing the key performance index (KPI), which covers each business stage of Asset Life Cycle is the foundation for Grid Companies to optimally *manage asset. Chinese Power Companies normally conduct asset management tasks, such as planning, purchasing, construction, operation and maintenance, disposal management as functional silo. Traditional design of performance index usually takes a particular business segment as an objective and can only achieve partial optimization. This often causes each department focus on its own benefits while jeopardizing the company's overall business efficiency. Shanghai Municipal Electric Power Company follows the management mission of "the front end process serves the back end while back end process monitors front end in a business cycle". It targets on the overall balancing of safety, efficacy and cost of asset management, taking overall optimization as principle, and established a systematic frame work of process KPI ("P-KPI"). The KPI collecting and calculating methods based on existing information system are also designed. The P-KPI consolidates data from different information systems representing a life cycle view of projects and assets. By regularly monitoring and analyzing P-KPI and defining its relationship with EVA, asset management's bottle neck can be identified and be solved in order to continuously improve the overall asset management performance.*

1 INTRODUCTION

For a power grid corporation, Life Cycle Asset Management is an important corporate strategy, which is aimed to achieve balanced overall optimization between operation performance and cost. For Chinese Power Companies, how to achieve smooth process execution, define clear responsibility and realize information sharing under a functional silo management style has always been a dilemma. In order to effectively measure and monitor its asset management performance, Shanghai Municipal Electric Power Company established a systematic process KPI framework based on the management mission of "the front end process serves the back end while back end process monitors front end in a business cycle". The P-KPI system is designed to follow the principle of overall optimization as whole system and the objective of balancing safety, efficacy and cost. The P-KPI system is designed to evaluate processes from three aspects of compliance, accuracy and timely. It can be used by different management levels. With the help of P-KPI system, retroactive reporting can be transformed to proactive monitoring while retroactive assessment can be transformed to proactive control.

2 WORKING APPROACHES

The P-KPI system is used to evaluate and monitor asset management processes by different management levels in a grid company. It focuses on if existing processes and their execution quality can sufficiently support asset management with high standard and efficiency.

The design and setup of the P-KPI system is closely related to the company's business practice. The detailed methodology is discussed below.

2.1 Information Collection

First of all, existing business process documents and management guidelines were collected and reviewed throughout the company in order to get an overview of current status of the companies' asset management. And then, based on overall objective of asset management, key business processes for research are chosen. The design objectives of potential P-KPI were also set up, which is aimed to improve the overall quality of asset management of the company as a whole.

2.2Business Process Analysis and Selection of Key Business Process to be Monitored

Inter-departmental activities and responsibilities of each department involved in the key business process was further analyzed, including relevant internal policies.

In addition, the supportability to processes of existing IT system is also studied. Key processes are selected if they cover multi-departments and can be monitored through IT system. The results above are used to disassemble the business processes into process nodes from both horizontal and vertical dimensions. Thus, problems and weaknesses during execution of these business processes are easy to be found according to their coupling relationship.

Based on the principle that the back end process monitors front end, key process nodes are then identified which can affect the overall performance of the business process. When designing relevant P-KPIs, it is ensured that each process node is assigned to the responsibility of certain department or employee. Thus P-KPIs can also be assigned to relevant departments or employees clearly and reasonably.

2.3 Design of P-KPI Framework

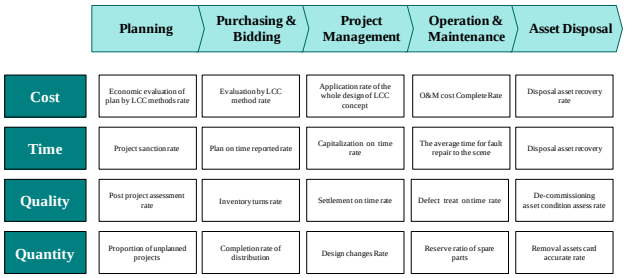

Figure 1 P-KPI Framework

The P-KPI framework covers all the stage of asset management, including planning, purchasing and bidding, project management, operation and maintenance, and asset disposal. See figure 1, it can be used to monitor business processes from four aspects (cost, time, quality and quantity) which formed the "CTQQ" model. The P-KPI framework is a multi-dimensional, comprehensive index system.

2.4 Definition of P-KPI for Key Processes

Process nodes are analyzed for key processes and key performance indicators are defined from timely and veracity dimensions.

For timely dimension, it means to increase the execution efficiency of business processes through assuring tasks between business nodes are completed within the maximum allowed time or planned timeline.

For compliance dimension, it means to execute processes as required in terms of quality and accuracy. A P-KPI of compliance is to assess if the process is conducted following relevant regulations and can provide integral, unified and correct information.

After each P-KPI is designed, a definition card for it is created which includes name, purpose, responsible entity, calculation formula, detailed definition, data acquisition method and statistical frequency.

2.5 Design of Data Acquisition Method

For every term in the calculation formulas of the P-KPI's definitions, it is clarified whether supporting data is able to be acquired directly from IT system and which one. Then, methods of acquisition are designed and the level of difficulty to acquire data is estimated according to the supportability of company's existing IT system. The feasibility of an integrated algorithm for multi-system data acquisition and arithmetic for automatic calculation are also estimated. Upon completion of these assessments, proper calculation methods are chosen for each P-KPI. This step is very valuable for realization of monitoring overall asset management performance through information integration and sharing across multi-system supported by the single project code, asset code and equipment code.

2.6 Example

Taking process of equipment capitalization as an example, two objectives of improvement are set at the beginning. One is to increase the efficiency of equipment capitalization by assuring it to take place in time. And the other is to increase the quality of asset related data through assuring the unity of information in different stages (asset, equipment and their records) of capitalized equipment in the IT system.

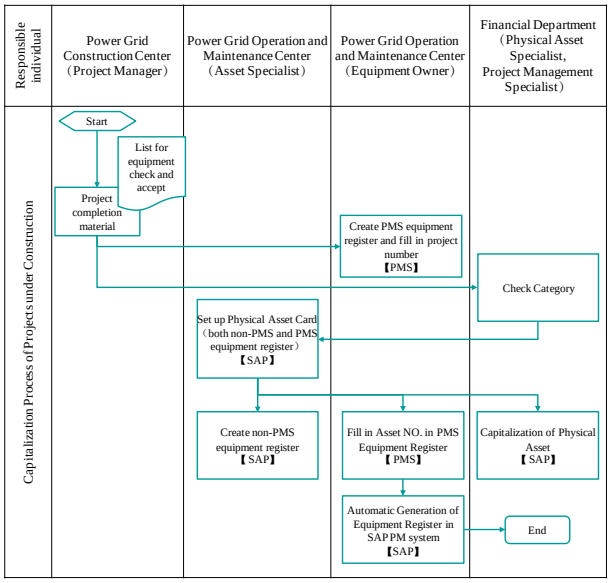

Figure 2Capitalization Process for Construction Projects

Critical points in the process are analyzed and showed in Figure 2. Key monitoring process nodes are listed in Table 1. Several P-KPIs are defined in details for this business process accordingly from timely and compliance dimension.

	Project Manager	Asset Specialist	Equipment Owner	Financial Department
Compliance	Accuracy of Equipment Check and Accept List	Unity of information on AM and PM Card	Integrity of Information in PMS Register	Accuracy of values on Physical Asset Card
Timely	Timely Creation of Equipment Check and Accept List	Timely Creation of Physical Asset Card	Timely Creation of PMS Register	Timely Setting Values for AM Physical Asset Card

Table 1 Critical Nodes Monitored

3 APPLICATION OF P-KPI

3.1 Hierarchical application of process KPI

P-KPIs are divided into three categories in term of application purpose, which are performance appraisal, performance monitoring and performance analysis. The three categories are respectively useful for the company, departments and special employees. The hierarchical application of process KPI is shown in Figure 3.

KPI for performance appraisal: this type of KPI has direct effect on the execution quality of corresponding business process and is able to reflect the overall performance of a business process or a part of a department. The selected P-KPIs are either required by the parent company, the State Grid of China or relevant to key processes. They must be easy to be quantified and the supporting data is easy to be acquired.

KPI for performance monitoring: this type of P-KPI can be calculated and monitored monthly or quarterly to form reports with standardized format. The selected P-KPIs can support those P-KPIs for performance appraisal but not as important as the latter.

KPI for performance analysis: this type of KPI can be used to thoroughly diagnose and identify problems and weaknesses of key business processes. The selected P-KPIs can be used to conduct flexible analysis.

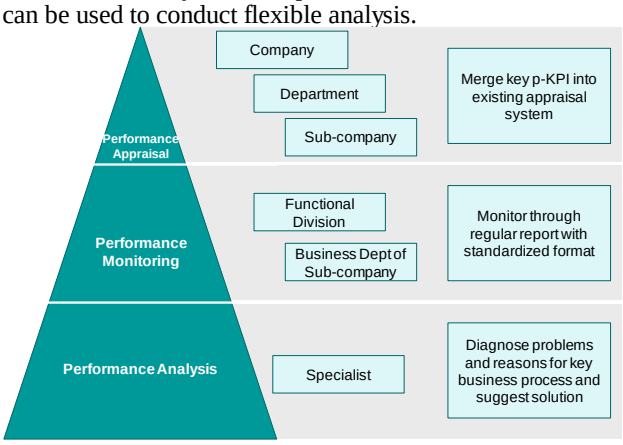

Figure 3 Application Framework

3.2 Steps to apply P-KPI

There are three steps to apply P- KPI for management improvement. First of all, monthly/quarterly report with P-KPI result is conducted to understand the overall status quo of business processes. Then, processes with low performance are analyzed and diagnosed to identify problems and reasons behind. Finally, solutions are designed to resolve these problems.

4. COMBINED STUDY OF EVA AND P-KPI

EVA (Economic Value Added) is a financial tool for evaluating corporate performance based on profit after tax and the cost of financing to generate the profit.

Process KPI and its effect on EVA can be combined through analyzing the relationship between execution quality of business process and company's overall operation performance. Detailed steps for combined study are as followed:

(1) To analyze and disassemble EVA formula and find the financial drivers for EVA.

(2) To link financial drivers to business process drivers and find the corresponding relationship between them.

(3) To select P-KPIs for quantitative analysis, which are sufficiently supported by existing IT system and whose changes would affect corresponding financial drivers directly.

(4) To design simulation scenarios and conduct quantitative study on selected P-KPI's effect on EVA value. The changes of simulation scenarios will have quantitative effect on EVA value. The scenario change can be either direct change on relevant P-KPIs or changes stimulated from quantitative change of other factors. On the other hand, the stimulus of change can be either internal or external. For example, internal reasons may include improvement of asset disposal rate, while external reasons may include extension of asset depreciation period required by the regulator.

(5) To analyze each selected KPI's effect in the designed scenarios and conduct quantitative study. Thus, quantitative relationships between business process improvement and EVA value can be established.

5. CONCLUSION AND FUTURE WORK

In this paper, we introduced the design process of process key performance indicator (P-KPI) system for key business process of Shanghai Municipal Electric Power Company. First, we reviewed the current status and quality of the company's asset management. And then, the P-KPI system and its raw data acquisition method were designed, which is aimed to improve execution quality of business process. Also, the application of P-KPI was suggested. At the end, a combined study of EVA and business process was conducted as well.

In the future, the P-KPIs are going to be implemented into company's ERP system. During its application, the calculation formula, application scope, data acquisition method of the system will be adjusted dynamically in order to be better combined with the company's existing management. After it reaches maturity, the application of this P-KPI system could support optimized decision making across the company. It would also lead to the continuous performance improvement in the areas of life cycle asset management throughout different levels.

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