

# ASSETS MANAGEMENT AROUND URBAN RAIL TRANSIT

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**Abstract:** In this article the common characters of urban rail transit industry are analysed and summarised. Based on this analysis, this article lists the characters in assets management which are different from other traffic industry, and explains how to apply the lifecycle theory for assets management in rail transit business. Firstly, we analyze the transaction requirements in rail industry. Then, the framework of Management Information System (MIS) for rail transit company has been proposed. Through the analysis and introducing of workflow in rail transit business, this article elaborated on the essentiality of the assets MIS which was important to the safely and economical running as well as the efficient and thinning management. Finally, the article give some suggestions for assets management in urban rail transit.

## 1 INTRODUCTION

We all know that the public transport is a important component of the people mobility infrastructure, specially in the city area (Aele Caltabiano, 2000). Nowadays, the pace of development of the urban rail transit in our country is accelerating. There are more than 800 km railways by 2010 -- especially in Beijing and Shanghai which boast more than 200 km in each (ZhuTao, 2010). According to the Chinese rail transport planning, about 1733 km would be built over next decade. It is obviously that China has already formed the largest-scale as well as the fastest growing urban rail transit market in the world (Chen and Wang, 2010).

The requirements of assets management in Rail Company have been increasingly becoming strict and severe with the continuous development of urban rail transit. It is well known to all that the urban rail transit construction, the greatest nonprofits communication infrastructure facilities (Peters, 2010) in China ever, is one of the projects of construction for next hundred years. Therefore, once the city roadway traffic projects are putted to running, the core of supervisory is contacting all parts of the system in order to ensure the safety and efficiency (Abrahamsson and Soder 2011). Only on the basis of security can improve the efficiency and effectiveness (Alegre, 2010) for the system. However, the normal operation of the system depends on the high stability and reliability of the

devices. Consequently, it is a huge problem for assets management (Khurshid et al., 2011) to break down departmental barriers, realize controllable management, and improve the analysis capability of benefits. In this article, from the angle of assets management informationization (Xie et al., 2007), we mainly discuss the questions mentioned above.

## 2 LITERATURE REVIEW

Asset management, broadly defined, refers to any system whereby things that are of value to an entity or group are monitored and maintained. Based on this definition, the business processes and enabling information systems that support management of an organization's assets, both physical (such as buildings, equipment, infrastructure etc.) and non-physical such as information and business practice management.

Currently, the state of assets management study (Meyer et al., 2010) is comparative maturity. But for traffic industry, it is not the case. As is known to all, China is presently enjoying constructing the rail transit and has become the biggest market for the construction of rail transit. And, safety, effective operations and serving societies are the primary goals of rail transit business (Dashti et al., 2010). Even though, there are still plenty of problems in its management information system (Kliwer and Suhl, 2011). Having consulting the literature, we found

out that most of the lectures in the field are not quite complete the goal of assets management in urban rail transit business. Some are just deal with the physical part, developing a information system to cope with the physical asset management (QuZhiling, 2010). And some are concentrating efforts on non-physical assets, they usually give some theoretical suggestions. For both parts, the assets management is not perfect integrated (Bagchi and Kumar, 2009).

In order to achieving the goal of assets management in urban traffic, this article furthers the study of rail transit industry. This ongoing and kind of exploratory work proposes a novel model that fulfils the system targets, such as break down departmental barriers, realize controllable management, and improve the analysis capability of benefits.

This paper is organized as followings. Firstly, we analyze the transaction requirements in rail industry. Then, the framework of Management Information System (MIS) for rail transit company has been proposed. Through the analysis and introducing of workflow in rail transit business, this article elaborated on the essentiality of the assets MIS which was important to the safely and economical running as well as the efficient and thinning management. Finally, the article gives some suggestions for assets management in urban rail transit.

### 3 THE CHARACTERS OF ASSETS MANAGEMENT OF RAIL TRANSIT INDUSTRY

From the view of assets management (Ratnayake et al. 2010), urban rail transit is an intensive enterprise, which has a large-scale of infrastructure construction and investment with typical property. Therefore, the goal of assets management, based on the life cycle management, is to pay more attention to the devices, whether in the project construction or the running phase. Much emphasis should be putted on the devices, such as scheduled and preventive maintenance, since those measures are good for assets (Loo et al, 2010). Only in this method can the company offer good traffic services and control the operation costs effectively. In order to reaching the

target of assets management, the following requirements should be taken into account:

- Life cycle management of assets. Based on the theory, it is important to realize the assets management in accordance with workflow from one stage to another, such as planning, design, manufacture, purchase, instalment, application, maintenance, update and so on. In this way can the company avoid capital run off and achieve cost-optimal.
- Different levels and types of properties supervisory. Given the principles of economy and security, the different management and maintenance models should be in accordance with the different levels and types of the apparatus.
- Master budget. Since the amount of rail transit assets is huge, the maintenance management should adopt budget model. According to history data to draw up the financial plan and budget target for equipment repair.
- Safely operation and reasonable maintenance management. In order to ensure the reliability and economy of the system, the management of devices should take standard and integrated manner. As for outsourcing maintenance management, it is needed to evaluate the performance, for the sake of providing proof for outsourcing maintenance in the future.
- Material management. A specification workflow of material management can contribute to the company enormously, such as timely completion of production plan and largely reduction of the cost of purchase and storage.
- Integrated management of assets. Assets MIS means an administration platform for companies. It should meet the needs of various management levels. To be specific, an assets MIS should conclude those basic functions, which are, implementing standard transaction workflow, building appraisal targets for different transaction layers, satisfying the demands from diverse management levels.

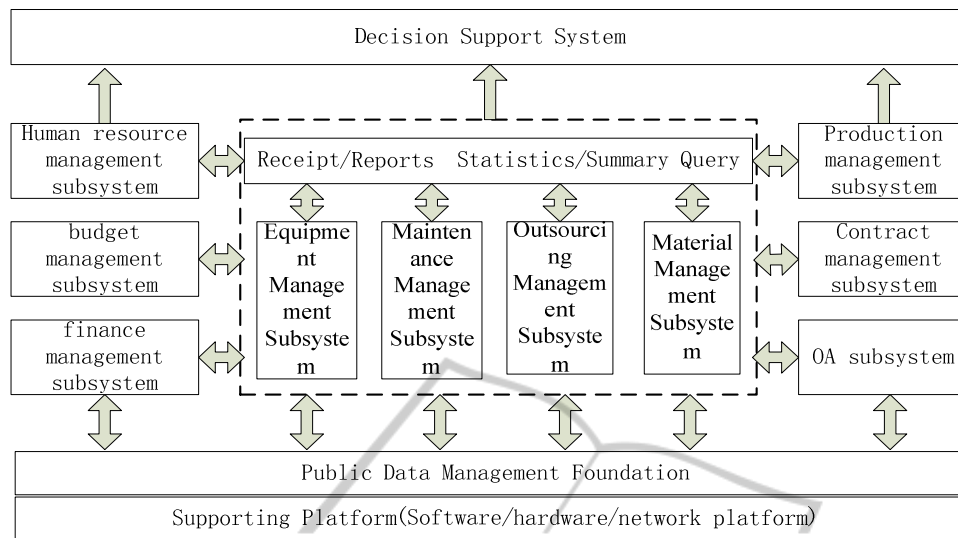


Figure 1: The Assets MIS framework.

#### 4 THE FRAMEWORK OF ASSETS MANAGEMENT INFORMATION SYSTEM

In the angel of capital management, rail transit is a huge and complex material system, including physical and non-physical parts, made of such subsystems like rails, locomotives, power, telecommunications, signals, business information, operation planning and so on. In order to satisfy the need for assets management, the structure of the MIS as figure 1.

Generally speaking, the whole system consists of four subsystems, namely, equipment management, maintenance management, outsourcing management and material management subsystem. Next, we are to give the detail information for each subsystem.

##### 4.1 Equipment Management Subsystem

The main task of equipment management subsystem involves pre-management, subsequent management and professional device management. To be specific, pre-management means the basic and static information for the device, including the management of basic information, failure, maintenance, technical data, etc. Subsequence management of equipment takes in charge of the dynamic information, which being used by the device. The subsequence management mainly

including quantity insurance management, device updating management, and scraping management, etc. Professional device management provides the management of non-productive device, professional device, and specific equipment.

##### 4.2 Maintenance Management Subsystem

Subsystem of maintenance management is designed to conduct the planned, malfunctioned and preventive maintenance management. Specifically speaking, planned maintenance management mainly involves the budget, planning, inspection, inquiry and other transaction managements. In this subsystem, the data of labor hour, material consumption, and other maintenance records can be recorded and queried. Those statistics are important to the company. Malfunction maintenance management concludes the transactions like information posting, reports processing and mission generating. From the view of function, this part of the subsystem mainly implements the automatic transaction process, and the inspection, inquiry, track management. And for the preventive maintenance management, it includes features like building predictive and maintenance models, analyzing maintenance data, and proposing recommendations of the management of maintenance programs and other business management. Through this function can achieve the goal of accurate calculations of reliable running time, scientific plan for device maintenance

schedule, reasonable allocation of maintenance equipments as well as reducing the sudden abnormal failure of the serious impact during operation.

### 4.3 Outsourcing Management Subsystem

Outsourcing management subsystem is responsible for the outsource operation of the asset, mainly including maintenance unit and contract management. The functions like distribution, repairing, evaluation, and performance appraisal can be conducted in the subsystem. Broadly speaking, maintenance unit management stands for the fundamental data management such as the basic information and the quality, credit of the company. Contract management of outsourcing involves managements of the operation of the project and the contract. Maintenance of unit performance appraisal covers the examination of the system effect according to the condition of the project. At last, evaluation of outsource management includes building the model to evaluate the production to the company comprehensively.

### 4.4 Material Management Subsystem

Material management subsystem makes a contribution to the managements of planning, procurement, storage, distribution for the material.

There are three management aspects, that is, material information, procurement and warehouse management. In this subsystem, material information management refers to coding rules, the basic information, supplies and pricing information, storage, and financial management. It is the fundament of the entire material management. Purchase management refers to generate procurement plan based on the application of some relevant departments. At the same time, it should help to form and execute the purchase task. In addition, warehouse management refers to the one for storage of goods arrival, material storage, shipping and inside-dumping, inventory management and other services.

## 5 TOP-LEVEL DATA FLOW DIAGRAM OF REQUIREMENT MODEL

The data flow diagram depicts the overall data flow in this system. This first-level data flow diagram emphasizes the fundamental data which are important to relationships among each subsystem. At the same time, it also stress connection with other external entity. Through the analysis mentioned above, the top-level data flow diagram as figure 2:

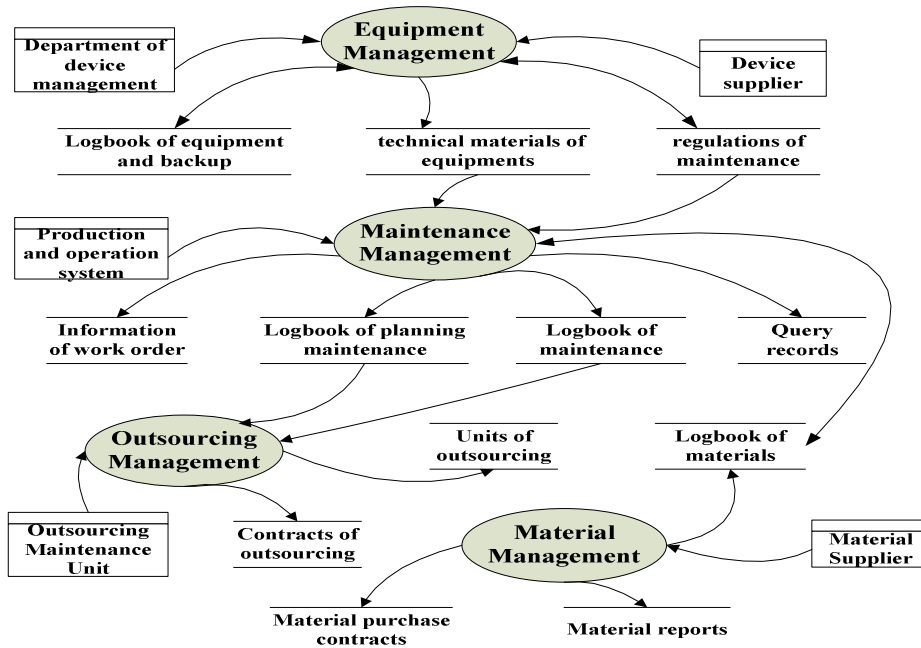


Figure 2: Top-level data flow diagram of the system.

Operational asset management subsystem mainly involves such data as followings: the regulations of maintenance, the technical materials of equipments, the logbook of equipments and backups, the status data of devices, the comprehensive planning of devices' maintenance, and data of maintenance, outsourcing management.

To be specific, the maintenance regulations mainly include rules of assets purchase, transfer, discard, etc. The technical materials of equipments means the documents which supplied by producer. And the logbook of equipments and backups involves information like number, name, pattern, address of the specific device. The detail information of each part can be seen from figure 2. Based on the data flow analysis, we would have a better understanding of the information process in assets management for rail transit business.

## 6 CONCLUSIONS

In sum, this article provides a demonstration about the needs associated with asset management of rail transit. It also interprets the structure of asset information management system. For the reason that this system is a complicated project, it is firmly recommended to follow the principle of "master plan, step by step". The management would be better to combine with the new-coming management theories according to the model of life cycle management. Only when designer put this consideration at the beginning of the project can the enterprise achieve the purpose of modernization and automation.

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