Journal of the Society of Korea Industrial and Systems Engineering
Vol. 32, No. 4, pp.38－44, December 2009.

데이터 적합성과 신뢰성 향상을 위한 기준정보 혁신의 효과분석

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Effect Analysis of Master Data Innovation for Increasing Data Suitability and Reliability

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본 연구는 BPR(Business Process Reengineering)을 이루기 위한 가장 근본적이고 중요한 정보의 통합관리로써 MDM(Master Data Management)이라는 기준정보 관리 체계를 제시하였으며, 효과를 산출하기 위하여 국내의 글로벌 A 기업이 수행한 MDM 시스템을 분석하였다. 인사 및 고객 정보 위주로만 사용되었던 MDM을 제품 생산에 직접적으로 연관된 장비와 자재 부문까지 확장시켜 전사적으로 기업을 관리할 수 있는 정보 관리 체계의 효과를 분석하는 것이 본 연구의 목적이다. MDM은 전사의 가치 있는 기준정보를 명확히 정의하고 이를 하나의 데이터 시스템에서 관리하여 정보의 품질과 객관성을 유지시키는 동시에 기업환경에 맞춰 생성 및 수정을 하여 현실성을 유지시킨다. 또한 중앙 분산식 데이터 시스템을 사용함으로써 기준정보를 만들어 내거나 또는 사용하는 모든 정보시스템은 MDM을 거친 정보를 제공받음으로써 데이터의 적합성과 신뢰성을 보장받는다.

Keywords : Data Reliability, MDM, BPR

1. Introduction

The problem, most businesses have is the reliability of the master data which is the original information, because each information system per department processes different values, and this prolongs the top management's decisions [11, 12]. Productive activities including manufacturing, warehouse management, distribution and research need an IT based system to efficiently manage the newly created information [10]. This research defines the theoretical background and concept of the innovative management system and MDM (Master Data Management) system, then look over Company A's usage of the MDM system. The focus will be on the As-Is analysis of to locate the previous problems in company A's equipment

논문접수일 : 2009년 04월 29일 논문수정일 : 2009년 10월 07일 게재확정일 : 2009년 10월 20일
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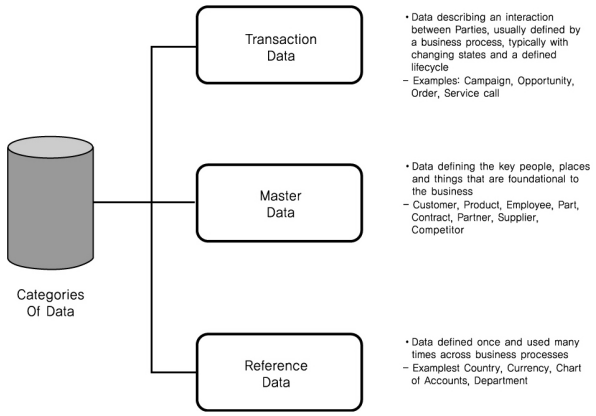
information management, then view to the definition of the To-Be process to resolve the problems, and finally analyze the effects after modifications were applied. This research will focus on Company A's corporate MDM project : direct effect on the productivity by equipment MDM project which is still no case in manufacturing companies.

2. Integrated Management of Master Data

2.1 Concept of Master Data

Many information systems such as the Enterprise Resource Planning (ERP) system, Sales Force Automation (SFA) system which supports the business department, and Manufacturing Execution System (MES) which supports the manufacturing sector. These systems generally provide three types of information as shown in <Figure 1>; Master Data, Transaction Data and Reference Data.

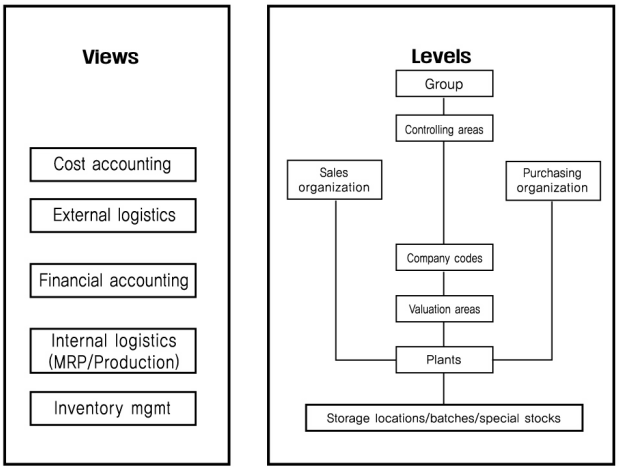


<Figure 1> System Data Classification at IBM and Oracle

2.1.1 Structure and Characteristics of Standard Information

Normally standard information is based on numbering a piece of information. This can be seen as a simple process but one piece of standard information has hundreds of attribute info and information grouping can take place depending on the system features, leveling can take place depending on the managing organization, and partitioning can take place depending on the authority on creating/modification or the department that uses the information [1].

For instance, as shown in <Figure 2>, the views of managed material codes have the business base data in common and can be classified into the material code, product name and unit. They also have the MRP view which is related to the material usage plan such as the MRP type, MRP area and planning cycle in common, ad can be classified into 13 views such as the buying related data including the buying manager information, sales related data and quality management data. So each piece of standard information has a different authority and is maintained by different standards per managing sector.



<Figure 2> Material MasterLevel per Operational View or Organization [6]

2.1.2 Importance of Standard Information

Standard Information strongly affects the business process as it is utilized in general work areas and related systems in the company and to control them. When business operations begin based on the precise standard information, the work process can be proceeded the same standard and inefficient repetitive work can be eliminated, which will produce a maximized process to handle the transactions [1]. However if there is an error in the standard information or a unit is input incorrectly, the process will be resulted in the wrong direction and cause error data and result in affecting business management and work progress.

2.2 Definition of MDM

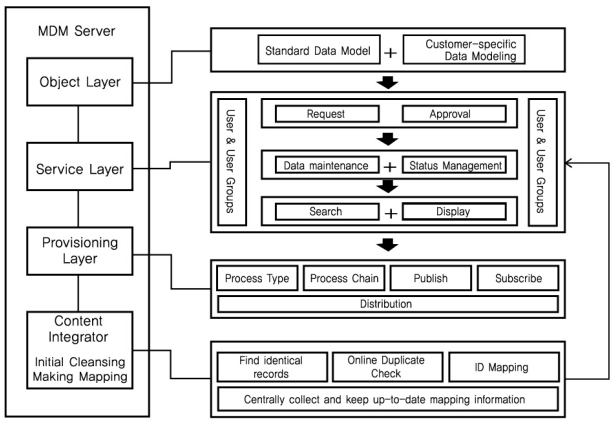
The integration of information or the systematic process usage are the most important factors to business management. Nowadays many global firms put a huge significance in BPR in MDM, which manages standard information, as a part of Enterprise Information Management (EIM).

MDM contains standard information which must be collec-

tively applied in a single Master Data Server (MDS) and manages it in the center, and distributes the necessary standard information to individual Master Data Client (MDC)s[1]. This process in the MDM simplifies complicated and diverse master data management and maintains the conformability. For the managing and maintaining functions, MDM also means a team which actually do these works.

2.2.1 Consideration of Object Layer

Just as a normal package is the standard functions can be remodeled through customizing, but there are views that it is better not to use a package in cases when customer characteristics need to be added. So the important factor to be considered is that, when creating models specifically for a customer, it must be at a easy level like as making a standard data model. For instance, after the data modeling of a receptacle to save the standard information, CRUD (Create, Retrieve, Update and Delete) is needed which programs to create standard information, modify and delete information. So the CRUD program must be able to be applied on both the standard data and the customer custom-made model. <Figure 3> is an explanation on each MDM system and the processes.



<Figure 3> Functions per MDM Layer [3]

2.2.2 Functions of Service Layer

This part is the function of calling the standard information of MDM, creating standard information through authorization and inquiring through searching as well as status management, preserving and maintaining. Here, a flexible work flow is necessary for an efficient process of authorization, modification, juxtaposition, and deferring process. Also, it is possible to request for a vast amount of information as well as getting authorization through the 'Multi-item Request & Approval' function which raises the efficiency. Among 'Status Management' related functions, there is a 'Produce Life Cycle' function to manage the launching and end of production dates. This function manages the entire history of a product from its development, mass production, end of sales to discarding, which affects the buying process as in cases when orders cannot be submitted. The 'Search & Display' function provides many sub-functions such as 'Data Comparison' which compares the qualities and prices, 'Hierarchy Search' function, 'Range Search' function in cases of the range being over 1,000, 'Multi-Properties Search' function and 'Search within Search Results' function. These functions are crucial for the system usage to utilize the created standard information.

2.2.3 Cautions of Provision Layer

Standard information often influences all sectors of the business and due to this feature of having to apply a coherent standard, the same information must have the same value in the business system. In cases of business updates, all systems which use these standard information must be upgraded simultaneously. Thus, if there are time or value differences during the upgrade, the process is off standards during the process and will have adverse affects on the work operation. From this point of view, the MDM dividing function depends in what circumstances, with what standard information, to which MDC, quickly and precisely.

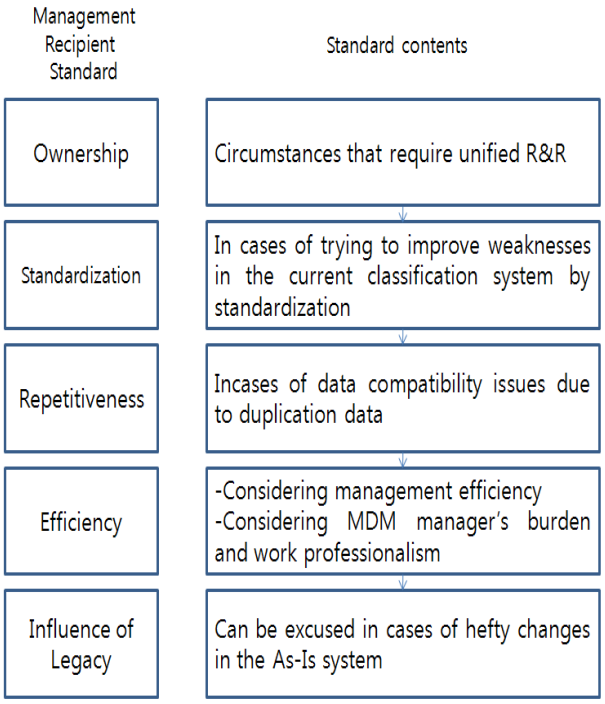
2.2.4 Functions of Contents Integrator

This function deletes repetitive or not cohesive standard information to maintain the coordination. If a new product part was requested to be registered, it is important to check whether parts that have similar characteristics already exist or whether it can be used as an equal product part for quick and precise decision making.

3. Case Studies of Master Data Innovation

3.1 Selecting objects

MDM allows applications and systems with different platforms that respond to various business environments to communicate and manage information in an integrated manner [2]. <Figure 4> explains the management recipient standard on MDM system and structure.



<Figure 4> Standard of Recipient of MDM Management [4, 5]

In this dissertation, we will look at an internationally known domestic business A's equipment sector cases that applied the MDM standard information management system to resolve problems due to short-sighted vision per department and issues regarding standard information quality and relation between information systems.

In order to standardize the standard information of Company A's equipment, hardware types and actual management and operation subjects were clarified, and this became the basis to cleanse the previous information. The accurate objective of MDM operation was to prevent the repetition of information by giving a different code for the equipment, allowing all connected system to differentiate equipments. The equipment codes were to be single codes like personal identification numbers, so they would not change even if it was moved to a different factory or corporation. Another goal was to allow organizations that operate equipment or financial organizations that approach equipment as a capital attribute, to recognize the exact life cycle of equipment. So from the totalitarian view of Company A, the objective was promoting the productivity and asset management efficiency of equipment operation through systematic management of equipment information for operation and management. Company A analyzed the standard information into three views; the systematic view, the process view and the system view.

3.2 Status Analysis in A Company

3.2.1 The Systematic View

1) Code System Analysis

Company A had manufacturing plants at the domestic head office as well as branches abroad but each corporation had a different equipment code system. Plus, even within the same corporation, code systems were different if systems were different and equipment codes were different for development and production.

2) Attribute System Analysis

If the name of equipment is a code, an attribute is the set characteristics of the equipment. Equipment contain much information from the current production and research location, managing department to the maker's name, model and proper manufacturing number. It also has company names for maintenance and repairs, the basic production process type and asset management numbers given by the finance department. The problem with attribute systems is that there is a definition of the attribute, yet it often disagrees with the input value. Also, the theoretical definition, the systematic definition and the definition per organization can be different. There could be an ignored attribute system or compatibility issues between systems or just completely different systems.

3) Classification System Analysis

Company A did not have a common standard classification system that all of its branches could use. The equipment classification system was usually managed by the equipment management department or the work progress management department that were directly related to the equipment. Other departments usually used the information set by these managing departments. However, production departments that defined the classi-

<Table 1> Equipment Classification Consideration

Considera-tion Factors	Equipment Management (CMMS) View.	Planning, preservation, maintenance, After-service.
	MES View.	Analyzing performance compared to Objective, efficiency(productivity), Operating ratio.
	Asset Management View.	Repatriation(value, profit), Depreciation
	Cost and Managerial Accounting View.	Cost, Profit

fication system had different standards in other branches or factories, and this caused problems for the finance department as they had no concrete data to base their production standard. <Table 1> shows each view and concepts about equipment related teams in company A.

3.2.2 The Process View

The equipment managing department in Company A can be divided into three sub-departments; technology, production and work progress. The subject department of the equipment is the technical organization which operates the entire life cycle of the equipment from ordering, managing and disposing it. But introducing equipment is not decided solely by the technical organization. Simply put, the budget to purchase the equipment is examined and is authorized a disposable budget by the investment organization. Afterwards, the buying organization places the order, finally settles the purchase, goes through customs, then the equipment management organization called the 'work-site operation' receives the equipment. When this entire process is completed, the buying department pays the final payment and the finance department gives the asset management number to the new equipment.

Company A has each independent support system to managing this 'purchase' process. And this system design resulted failure of connecting information between the two most important systems; the asset, and equip management systems. So company A tried to reduce this gap by educating person without any modifying the systems.

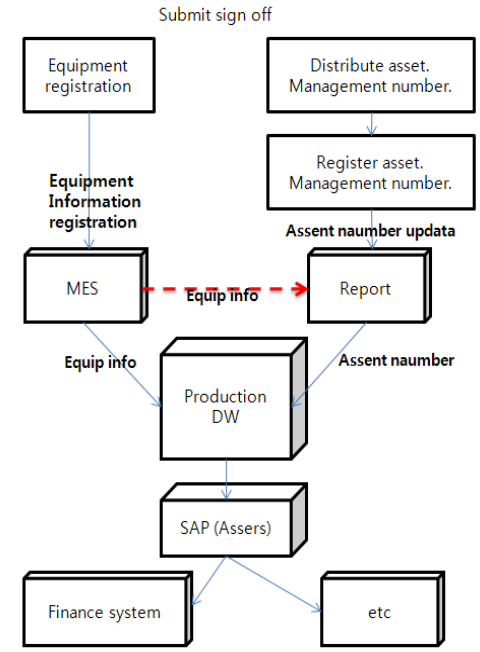
3.2.3 The System View

The objective of system analysis is to find the problem by understanding the role of each system and the influence of standard information before introducing MDM as well as grasping the connection on whether to utilize the standard information after applying MDM. System analysis is not about analyzing the information flow and improving the relations between the systems, but about understanding the functions of the system itself to find what problems it has to manage standard information.

In <Figure 5> the red line is one of main problem in company A's equipment related systems. MES and Report needs certain connection for translating information.

3.3 Innovation Process Direction

The objective of Company A's innovation process through



Asset number does not exist in the equipment master system MES
1)There are improvements in the data architecture as asset numbers the key items in equipment management are managed in the report system
2)Inoonvenience due to have to collect each information from the report system that manages MES and asset numbers and Master system to utilize asset information in other system

<Figure 5> As-Is System Analysis

enhancing information quality and compatibility is at the realization stage of strategic information for management. With this objective, the innovation process is drafted to predict the modifications based on the Status analysis of the various problems, the weak system and methods to improve the current/previous status.

3.3.1 The Systematic Solution

1) Code System Solution

The equipment code system must be singular without variability. To secure this, the code system requires several meanings which don't change the values but contains the minimum amount of information. Each code is given to each machine to secure singularity, and the code is linked to the equipment serial number to allow overlapping examinations in the system. Also, the original equipment code had much of the managing department's significance in the code. The code had not been changed for five years and the code was used to indicate the equipment itself on work sites. So in these cases the equipment code remains yet a standard code is input in the connected system and utilized as a key factor.

2) Attribute System Solution

In order to supplement the attribute system, a standardized system must be established to create equipment hierarchy and an essential attribute to manage the hardware related changes, such as location and structure, must be elicited. Also an asset management number and equipment proper number must be elicited to be used in many systems, then the data quality must be managed to enhance the standard. In cases of management on modifications, the information must have the changed information of before and after the change. For asset management numbers, the registration period as an asset at Company A must be managed, to tally the depreciation. The equipment maker information must be formed yet segmented into the actual maker, the overlapping buying sources, AS subcontract.

3) Classification System Solution

Company A's equipment classification system aims to assess the current status and improving the search and analysis, as well as providing a corporate, business related analysis function due to the organizational relation between systems.

Thus the innovation classification system puts four items including manufacturing equipment and transportation equipment regarding the equipments' characteristics and usage. Also the MES code system, which differentiates the production structure from business, and the 'Sourcing group',which is used for buying organizations to buy equipment, are used as reference to maintain the understanding of the work process.

Process	MDM role specifics
Equipment Lifecycle Management	• Pre-consultation to register/modify/hold equipment(when necessary) • Examining and authorizing equipment MDM regitration/modification/idle requests • Monitoring equipment objection/status change authorization and examination process
Equipment Master Standardization Management	• Agreeing on equipment code attribute addition/modification • Grasping influence of attribute addition/modification • MDM system change management • Data examination and feedback for standardization
Equipment Master Modeling Management	• Agreeing on adding/modifying data model (modeler view) • Grasping influence of data model change • Managing MDM modification
Interface maintenance & Management	• Supervising interface addition/modification • Grasping influence of interface modification • Managing MDM modification
Workflow Management	• Agreeing on changing authorization process and role • Managing MDM work flow modification

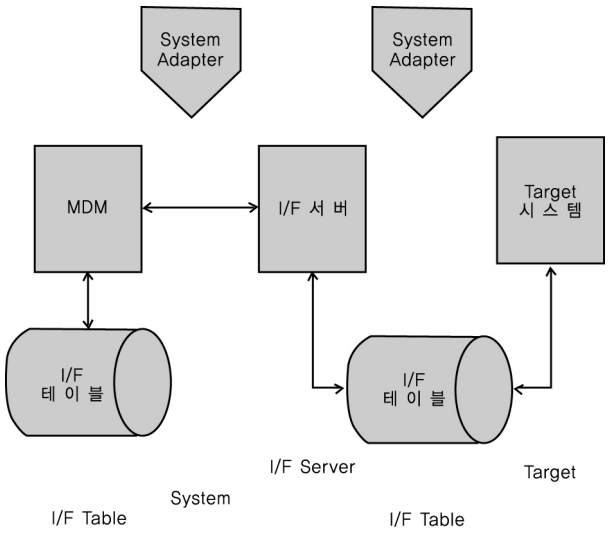
<Figure 6> Definition of innovation To-Be Organization Process

3.3.2 The Process Solution

The To-Be process is mainly defining the organization member's role process and reconstructing the system process through MDM. The To-Be process subjects are five elements of managing the equipment life cycle (registration/modification/idle), managing master standardization, managing master modeling, maintaining interface and managing work flow. <Figure 6> explains the role of work-site operation and MDM for this process.

3.3.3 The System Solution

The systems including those abroad must receive standardized information from the MDM simultaneously to the interface. This applies not just when creating information bust in cases of modifying or deleting information as well. The conformability is to allow all target systems to receive the data from the MDM (which had quality management). All system data including MDM must maintain conformability, quality and suitability. To do, there must be an interface between systems since the source system that crates standard information, MDM and the target system. If incorrect data was utilized in the system, the MDM must be given feedback automatically for it to fix the error. <Figure 7> is the system connecting method between the equipment manufacturing system MES and MDM.



<Figure 7> System Interface (Example : MES)

3.4 Measuring MDM Effects

3.4.1 Quantitative Effect

Company A tracked down 300,000 cases of unnecessary information right after adopting MDM. That's about 60.5% of the total information. Company A had been managing over half

of repetitive data or error data. In this thesis, from the case study results, the total amount of information dropped from 63,000 to 54,000, shrinking 14% of ignored data. According to 'Mckinsey and Company', one information code modification brings a yearly profit of at least $4 [7]. Based on this theory, Company A calculated that 'IBM'saw a yearly information management improvement profit of 30,000,000won, which actually generated 2.5 billion won. Thus, due to refined standard information usage, the in company management strategy system usage based on previous equipment information increased 230%.

Compared to other firms, business MDM introduction allowed the company to improve to international standards regarding general information system management systems. According to IBM's evaluation, in 2005, before adopting MDM, Company A reached only 68% in development. However, that figure reached 90% after adopting MDM, which is a higher figure than competitor S or other large scale manufacturing company L. IBM[8] noted that Company A had emerged into what they defined as 'Global Top' level standardization .

3.4.2 Qualitative Effects

Standardizing and integrating the standard information scattered about the system refined the structure in multi-levels, established a coherent information management system which led to data quality improvement. In the system application stages, a flexible construction existed with easy registration and modification of classification systems and attribute systems as well as materializing the work flow function on process. The interface function was also added for real-time legacy distribution. Also system maintenance and development expenses will decrease due to the enhanced system information efficiency and maintenance and development efficiency. This organizational relation between systems brings forth a singular process and enhances speedy conformity to change.

4. Conclusion

In order to introduce MDM, a common understanding from various sectors is necessary, but most departments recognize this as just another information system which will not portray any visual profit. Thus, their view on MDM is not clear [9]. However as shown in this dissertation in the case study of Company A, MDM shifts a partial view into an integrated view, data errors due to time difference into data compatibility due to simultaneous processing, process interruption into singular and organizational process to build the basis of RTE with through fast and accurate business management. If companies or societies adopted MDM when structuring the IT infrastructure and processes, Company A and other enterprises that wish to restructure their current system and structure would have a lighter budget to do so. Company A conducted the MDM project in equipment and four other sectors which took 4.8 billion won. They did see a profit of 25.8 billion won once five sectors completed the MDM project, of course. But if they had done the standardization operation with an integrated view in the initial stages of building the enterprise, the 4.8 billion won as well as the education costs and hours that firms like Company A will need to go through would not have been necessary. The 25.8 billion won saved on yearly management and improvement costs is actually the equal amount or more of losses in the past. So companies that dissipated expenses on the original information system should adopt the MDM project to minimize information maintenance costs as a reestablishing innovation, while newly established organizations should do the same as a integrated standardized concept.

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