Design of Life Cycle Management System of Logistics Information Standards and its Realization

Hyungrim Choi, Changsup Lee, Yongsung Park, Jaehyung Cho, Taewoo Kwon

Abstract—As the importance of standards is increasing recently, many efforts are been made for standard management at home, too. The biggest problem in utilizing standards is that users do not make use of them actively even though once the standards were put into establishment. Most of logistics workers are keenly aware of the necessity of logistics information standards but they feel it very difficult to access to the standards and even though the necessary standard was established, it was not elaborately presented along with the utilization plans such as publicity activity, education to industries so that they do not like to look for the related standard unless it is required to convert. Also as people and products have life cycle, standard has life cycle, too. Due to change in international environments, development of information technologies and change in systems, the standard is supposed to be revise or discard in a continuous manner. However, a case happens that users are using the old standard before the revision or disuse as it is because they could not be furnished with the necessary information of revision or disuse of the standard. Therefore, it needs systematic management of life cycle of standard such as establishment, revision, disuse, etc. and requires structure and information system, which are specified to logistics industry and by which life cycle of standards can be managed systematically. In this study, a new system, which is called as ‘Life Cycle Management System of Logistics Information Standards’ is presented and after reviewed the present state and defined the business, the information system for effective management of logistics information standard is designed to realize using the method of object-oriented design.

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I. INTRODUCTION

As the importance of standard is increasing recently, many efforts are making for standard management at home, too. The biggest problem in utilizing standard is that users do not make use of it actively even though once the standard was established. This is not only the problem in utilization of standard but also it could be more serious problem since it makes difficult to share and exchange information effectively among various logistics subjects. Actually, users are sparing much of their working times for search of standards because of standards used by individual, the subject and company and sometimes they make many documents repeatedly. It is important to provide integrated standard but also important to manage life cycle of standard in consideration as an object with life. Standard is also supposed to revise or disuse according to change in international environments, change in systems and introduction of new information technologies, etc. and such information should be furnished to users positively. For this purpose, in this study, the whole life cycles are defined in relation with standard such as establishment, revision, disuse and utilization regarding this management of standard, and analyzed the present state of management of logistics information standard like domestic and foreign standard related system so that logistics workers can search standard of logistics information easily to apply the search results to their works with no difficulty and also designed to realize life cycle management system of logistics information standards for standardization of domestic logistics information through reflection of opinions from various related experts in the field as a plan to activate standardization of logistics information.

II. RELATED STYDY

A. Outline of Standardization of Logistics Information

Standardization of logistics information is to standardize logistics information system for effective performance in operation of logistics information system by logistics related companies. Logistics information means news, information, facts occurring in the whole functions of logistics and information system means an aggregate of instruments, things or
organizations to form a network for distribution of something or for pursuit of a common purpose. The ultimate purpose of standardization of logistics information is based on effective management of logistics through share of information and integration of information among subjects to participate in logistics activities. Because for those factors such as customer service or customer satisfaction to influence on performance indicators, it is much more important of variables such as integration of information, connectivity, share of information than the information technology itself and it needs certainly standardized connection of logistics information for effective management and maintenance among companies.

B. Analysis of Domestic and Foreign Standard Management System

First of all, major domestic and foreign standard management systems are surveyed to review the present state of standard management system and standardization of logistics information which are now utilized at home and it is summarized by functions as shown in <TABLE 1>.

<table>
<thead>
<tr>
<th>Information system</th>
<th>Major functions</th>
</tr>
</thead>
</table>
| European Committee for Standardization (CEN) | • Main menu - Standard and Drafts, Sectors, Conformity Assessment, Members, Work Area, News, etc.  
• Search existing standards through Search Standards  
• Possible to search with key words(words, Number of standards)  
• Possible to search for information of process status of standards |
| Foreign                     | • Main menu - BSI Shop, Sectors & Conferences, BSI Training, Assessment & Certification, Product Testing, About BSI, etc.  
• Possible to search standards on Search Menu  
• Possible to search in details (JIS,ISO,IEC) on Search Menu  
• Possible to search information of JIS, IIS handbooks & announcements |
| British Standards Institution (BSI) | • Provides information of present state by standards and notice of standards  
• Possible to download information of guide lines of various developments, lecture materials & regulations, etc. |
| Japanese Standards Association (JSA) | • Provides information of domestic/foreign contents related with E-Trade(E-Documents, Business Process, Library, etc.)  
• Connects with standard management & storage for business type registration |
| Korean Standards Information Center (KATS) | • Main Menu - Consists of E-government's standard management system, Administrative standard code management system & Administrative information resources state management system  
• Function to take a role as representative contact window of infra system for performance of E-government's operations  
• Function of integrated service in form of portal to provide convenience in performance of operations |
| E-government's integrated infra service | • One-stop integrated search function of domestic/foreign technology standard information  
• Provides 23,000 kinds of KS information possessed in KATS  
• Function to provide domestic/foreign standards information |

At this present, there is no individual management system in operation for standardization of logistics information at home. Instead, electronic documents using in trading of logistics information are managed by National IT Industry Promotion Agency (NIPA), which is a subsidiary organization of Ministry of Knowledge Economy. Accordingly, we analyzed Korea e-Document Standard Committee(KEC) and REMKO which are managed by NIPA to look into the present state of standardization of logistic information. KEC is the organization in charge of establishment, revision, disuse of standards regarding e-trade contents as well as the related application technologies. As the result from looking into the standard management system, it is structuralized by various industries and we come to know that it is dominated by systems which are not systemized by business of logistics industry. Most of users think very difficult of their access to standard of logistics information and feel the necessity of the system for offer and management of standard of logistics information.

III. DESIGN OF SYSTEM AND ITS REALIZATION

A. Definition of Life Cycle Management System of Logistics Information Standards

The life cycle of standards presented by this study means the steps of establishment, revision and disuse and standard life cycle management system of logistics information is defined as an informational system for effective performance of users required matters management, development, evaluation, verification and repair and maintenance of standards, application to industries, diffusion of standards, increase of
utilization, etc. which are occurred in the whole processes of establishment and maintenance of standard of logistics information.

B. Definition of Operations

Operations for standard life cycle management of logistics information are defined to design standard life cycle management system of logistics information, which are made through analysis of the present standard management operations as well as interview with experts in standards. Standard life cycle management operations of logistics information mean collection of various requirements to be occurred in each stage of development of standard - establishment - revision - disuse after proposal of standard for logistics information and also operations such as selection of objects to be standardized, evaluation by users, evaluation of appropriateness, analysis of operations, development and evaluation of standards, presentation of standards, notice/registration of standards, development of programs for diffusion, monitoring of utilization, revision/disuse of standards, etc. Operations of standard development management of logistics information are proceeding by order of proposal of standard (proposal of revision/disuse) - selection of object to be standardized - evaluation by users of object to be standardized - internal & external evaluation of appropriateness of object to be standardized - classification of processes - analysis of operations - analysis & selection of existing alternatives - development of standard - evaluation of standard.

In case of establishment management of logistics information standard, after examination of the presented forms and documents of developed standard, it is presented to NIPA and in case of internal examination, technology committee and notice/registration of standard, these are operations to be performed by standard organizations so to be excluded from the scope of operations in this study. For once noticed and registered logistics information standard, after checked what would be problems in application and established the diffusion plan for the standard, proceed operations for users to utilize the standard through development and education of publicity materials of the concerned standard. Proceed continuous monitoring operation of utilization and observance of standards in use and in addition, through check up & analysis of standards which are duplicated, mistaken or unused as well as understanding and analysis of change in internal/external environment related to standards, preparing operations for new revision or disuse of standards are made.

C. System Structure and Definition of Major Functions

As life cycle management system of logistics information standard is a web-based system, it has three-steps of structure and the web-based three-steps of structure is normally consist of followings:

Major functions of life cycle management system of logistics information standards are consist of support functions for establishment, revision/disuse of standards, function of on-line consultant and opinion collection, real-time alarm function of standard information (ARMI service), search function, and education and public relations function.
D. System Design Using Object-oriented Development Methodology

Through development of system by object unit using UML as a object-oriented design technique, we intended to adapt well to change in environments such as new requirement of system or repair and maintenance and also raised reusability. For UML modelling, we used Rational Rose as the tool for object-oriented analysis, design and establishment. Through Use case Diagram, we classified users of management system of logistics information standards and designed functions required for each user. As shown in the figure, staffs in charge at the work-site operations, developers of standard, experts group and site manager, etc. on Use Case, Sequence Diagram, Class Diagram.

![Fig. 3 use case diagram](image1)

Fig. 3 use case diagram

Through Use case Diagram, we classified users of management system of logistics information standards and designed functions required for each user.

![Fig. 4 sequence diagram](image2)

Fig. 4 sequence diagram

Sequence Diagram was designed to check whether or not service was proceeding smoothly through time phased analysis of how to use major services of management system of logistics information standards.

![Fig. 5 class diagram](image3)

Fig. 5 class diagram

Class Diagram is to show how it is related with each class of management system of logistics information standards when a user requests a service. Through this, it is able to understand how the process is going on as per a request of service from a user.

E. System Realization

The presently realized life cycle management system of logistics information standards was made using Flex Builder 3 development tool, Flex 3.0(screen), Java 1.6(logic) on Windows XP SP3 OS. For data base, we used MS-SQL. In the realized system, we made all the functions by the manager possible to be performed on web. Operations of all matters related to the system such as user information checkup, designation of user group, information access authority set up by groups, user information management and home page menu management.

This system provides functions for authorized staffs in charge at the work-site operations, developers of standard, experts group and site manager to search or edit access authority to information or data as well as the concerned information or data.
It is able to give access authority to information or data inside the system as per the concerned group and user by the manager. <Fig. 7> is the screen to set up group creation and access authority to menu and data as per user.

Fig. 6 main screen

Also, it is able to search logistics information standards in search bar and in case of standard working group, new presented standards can be examined on web in accordance with examination standards.

IV. Conclusion

In this study, life cycle management system of logistics information standards was designed and realized using UML. To support UML modelling effectively, we used Rational Rose to visualize what the designer wanted to deliver in the analysis and design stage of requirements so to realize the system effectively. In future, we are going to study the possibility of linkage to "national logistics integrated information center" which is promoted at this present in consideration of the utilization of the system presented in this study. national logistics integrated information center is a project to establish a nation-wide logistics information infra for active linkage of information with unit logistics information system and also for security of visibility of information. The life cycle management system of logistics information standards proposed in this study will be able to link with "search service for logistics system information" out of those twelve kinds of sub-services provided by national logistics integrated information center. Also we are going to study of ontology-based data storage and the extra features for user convenience as a new search function so that logistics industry workers can search logistics information standards easily and apply the search results to their works easily.

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REFERENCES

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