

CITY UNIVERISTY OF HONG KONG

香港城市大學

Development of
Knowledge-based Integrated Management System
(KIMS)

for

Hong Kong Construction Industry
香港建造業的知識型綜合管理體系

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Abstract:

Establishing effective management systems have become indispensable components of organization survival in today's competitive business environment. Since early 1990's many construction companies in Hong Kong developed and certified the quality management system based on ISO 9001 due to the compulsory requirements of Housing Authority of Hong Kong Special Administration Region (HKSAR) government, which is one of the biggest customer of Hong Kong construction market. More and more stakeholders concern the environmental performance on construction activities, so many construction companies have to establish the environmental management system based on ISO 14001. After the enforcement of Factory and Industrial Undertakings (Safety Management) Regulation [F&IU(SM)] by the Hong Kong Government, construction companies have to establish, implement and maintain a Safety Management System up to the regulation's requirements compulsorily.

In order to fulfill the needs of similar requirements of different management systems, some of the system documentations, records and works are duplicated. Hong Kong construction industry needs an effective way to integrate the Quality, Environment and Safety Management System into an Integrated Management System (IMS) in order to reduce the duplicated efforts and streamline the operation.

Some of the existing Integrated Management System (IMS) models are focusing on integration of ISO 9001 based quality management system and ISO 14001 based environmental management system. Some of the other models cover safety and health management system based on Occupational Health and Safety Management System (OHSAS) 18001 requirements. F&IU(SM) is a compulsory regulation while OHSAS 18001 is a voluntary requirement. In recent competitive market environment, many companies implementing F&IU(SM) system do not prefer to spend additional resources to establish and implement the OHSAS 18001 system. Hence an IMS that cover quality, environment and safety management system based on ISO 9001, ISO 14001 and F&IU(SM) requirements is needed. However, such IMS framework is not available for the time being.

This research proposes a new IMS framework cover quality, environment and industrial safety based on ISO 9001, ISO 14001 and F&IU(SM) requirements. The IMS framework is suitable for Hong Kong construction industry, which can reduce the duplicated works and streamline the operation in order to enhance the competitiveness in competitive environment.

Due to the project-type nature, staff turnover rate of construction industry is high. In many cases, valuable knowledge is maintained in tacit format and being kept by individual staff. Without proper knowledge management (KM), valuable experience and knowledge will not be left in the organization when the staffs leave. Even the knowledge is properly recorded and

maintained in hard copy format, it is difficult and time consuming to identify, retrieve, reuse and share the valuable knowledge, especially when the physical hardcopies are difficult to access or in remote area. Very often people prefer to do from scratch again rather than search the existing archives, especially when the staff does not know the required information/knowledge exist in the archives or not. A lot of valuable knowledge accumulated in the organization is not used effectively. Such practice increases work load and slows down respond time, which in turn decrease competitiveness. Based on above mentioned, KM is needed for construction industry to enhance competitiveness. This project proposes to combine the knowledge management concept into a IMS model particularly for construction industry, which is not yet covered by existing research.

Based on the needs of IMS and KM, this research aims to develop a new and innovative Knowledge-based Integrated Management System (KIMS) model which covers Quality, Environment and Industrial Safety which will fulfill ISO 9001, ISO14001 and F&IU(SM) requirements. The KIMS model provides an effective and efficient way to better use the available knowledge of the IMS to handle the quality, environment and safety issues in construction organization. By implementing the KIMS model, the organization can enhance the business competitiveness in order to face today and upcoming challenging business environment of Hong Kong construction industry. In order to achieve the aim, four specific objectives are established, namely; (i) Develop an Integrated Management System Framework, (ii) Define a Knowledge based Integrated Management System (KIMS) model, (iii) Identify success factors and steps of implementation, and (iv) Validate the developed model by a case study.

As the results of the project, an IMS framework covering quality, environmental and safety aspect of a construction company is developed satisfactorily. The framework fulfills the ISO 9001, ISO 14001 and F&IU(SM) requirements. The framework divided in three sections: Goal Management, Process Management and Resource Management, and consist of six steps: Determination, Plan & Design, Acquisition, Deployment, Implementation, and Evaluation. Individual processes are continually improving through the Plan-Do-Check-Act four steps cycle. The framework is developed through literature review and combining the needs of relevant stakeholders, international requirements and legislative requirements. The KIMS model is then developed. The model consists of three layers: Project Team Layer, Business System Layer and Knowledge Base Layer. The links within and between each layer facilitate the four steps (Creation - Storage/Retrieval - Transfer - Application) KM process.

The success factors and a roadmap comprising three phases, Awareness, Preparation and Implementation, are also investigated and established. A twenty-step implementation guideline is developed to cover these steps. Lastly, the developed models and roadmaps are validated by implementing the KIMS model on a medium size Hong Kong based construction

engineering company, called Anderson Asphalt Limited (AAL). The validation results indicate that human, technology and process factors are all important on successful implementation of KIMS. KIMS does help the organization to improve people interaction and organization effectiveness, and the actual implementation results are beneficial in various areas in the organization.

In future research, the validated KIMS model can be enhanced to fulfill a more generic OHSAS 18001 health and safety management system standard. The KIMS model can be validated in other construction companies of different scale and work areas, or even in other industrial environment, such as manufacturing and services.

To conclude, the problem in traditional IMS is lack of the focus of knowledge-based built inside the IMS. The research proposed an innovative model (KIMS) to add the KM element into a new IMS framework. The new IMS framework is based on the well accepted ISO 9001, ISO 14001 and the compulsory F&IU(SM) requirements, which is not available from existing IMS model. In addition, the implementation guideline and roadmap provide a practical and feasible way for implementing the KIMS model.