Developing a Performance Review Questionnaire for Hong Kong Cadastral Survey System

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**SUMMARY**

Performance review facilitates an organization to meet its user demands and achieve planned goals. Evaluation on the performance of a cadastral survey system helps decision makers understand the current development of cadastral survey industry and the way forward to enhance its performance. As an indispensable function of a land administration system, the cadastral survey and mapping activities provide spatial related descriptions on cadastral interests. A fit-for-purpose cadastral survey system should meet the requirements of the society. To evaluate how well the cadastral survey industry fulfills its professional responsibility, a set of pre-established criteria and organizational objectives and the corresponding questions for performance review are required. Certainly, each cadastral survey system has its own unique characteristics. A developed self-assessment model for cadastral survey systems was introduced during the FIG conferences in the past two years. Here, based on the previously established structured performance assessment model, we further developed a set of appraisal questions for Hong Kong cadastral survey stakeholders to review the system performance. With sufficient feedbacks, we aim to investigate the status of the Hong Kong cadastral survey system in fulfilling its internal land surveying responsibilities and external duties in supporting a fit-for-purposes land administration system and a sustainable society.
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1. INTRODUCTION

Cadastral surveying is an essential function of a modern land administration system. Cadastral survey and mapping activities support various types and levels of land administrative procedures by providing spatial-related cadastral datasets. Producing different types of cadastral plans is the most perceived contributions of a cadastral survey system to the society. In a modern land administration system, the cadastral mapping framework serves as the backbone platform to visualize and manage the rights, responsibilities and restrictions of the land.

The current survey and mapping technology is undergoing evolutionary change. Theoretically, the technology capability of cadastral survey and mapping activities are significantly improved. However, the development of a cadastral survey system always needs to consider the backgrounds and current conditions of the jurisdiction. The societal requirements of a cadastral survey system decide the practicing survey and mapping technology in the system. Thus, cadastral survey systems are still different from each other.

All cadastral survey systems under different topographical, economic, legal and institutional settings have same purpose which is to support land administrative activities efficiently and effectively. To serve this purpose, the regulations and procedures may vary from one jurisdiction to another jurisdiction. As a type of professional service, a cadastral survey system is constituted by the cadastral survey infrastructure, cadastral survey service provider and the user. Cadastral surveyors are the key service provider and the key operator in the cadastral survey infrastructure. The user of the system can be land-related professions in both public and private sector, and also the general public. A fit-for-purpose cadastral survey system should meet the demands of its system users in an effective way.

To check how well each cadastral survey system operates, opinions on the system performance are required to be collected from its stakeholders. A structured performance assessment was introduced during the International Federation of Surveyors (FIG) conferences (Zhang and Tang, 2014; Zhang and Tang, 2015). The general assessment framework is shown in Figure 1. A case study on the Hong Kong cadastral survey system performance has been conducted locally based on the established assessment model. Questionnaire has been distributed to local land surveyors to measure their opinions on the constitution of an ideal cadastral survey system performance and their satisfaction level on the achievements of the current Hong Kong cadastral survey system.
Results on the relative importance of the proposed assessment criteria and achieved performance level of current Hong Kong cadastral survey system have been collected from local land surveyors and now is distributing to stakeholders other than land surveyors. The next step in comprehensively evaluating the performance of Hong Kong cadastral survey system is to collect more detailed performance information of the system from its stakeholders. Again, to review the performance of local cadastral survey and mapping activities are twofold. One is from the side of local land surveyors who are the key service provider of the system. The other is from the side of the users of the system. Comments on the development of local cadastral survey infrastructures are needed from land surveyors. Opinions on the outputs of local cadastral survey system are sought from land users.

This paper introduces a further step in designing a questionnaire to collect information on the performance of Hong Kong cadastral survey system from both local land surveyors and land stakeholders other than surveyor. Data collected by this performance review questionnaire aims to attach to the previously established assessment criteria set and to correlate with currently acquired performance scores of the local cadastral survey system. The structure of this paper is as follows. First, the assessment strategy is briefly introduced. Then, a review of previously established evaluation model is represented. Next, the principles of the questionnaire design for Hong Kong land stakeholders are discussed. At last, this paper introduces how to implement the questionnaire survey to the local cadastral survey industry; and concludes with the expected outcomes of the proposed questionnaire and the entire evaluation project on the cadastral survey systems.
2. STRATEGY ON CADASTRAL SURVEY SYSTEM EVALUATION

In the field of cadastre and land management, the elements of a fit-for-purpose approach (FIG and World Bank, 2014) may not be regarded as brand-new concepts individually (see, Ting and Williamson, 1999; and Robertson, 2002). Nonetheless, it provides a comprehensive framework to instruct jurisdictions to build and develop their cadastral infrastructures with reference to the dramatically developed technology in the geo-informatics industry. The expeditious development of Information and Communication Technology (ICT) enables land users to have more demands on the land industry. This also urges the policy maker and service provider to re-evaluate and then enhance the existing institutional framework and the services they provide. Certainly, an inspired and attentive vision on how to build and sustain the infrastructures is required and the Declaration on Fit-for-Purpose Land Administration (FIG and World Bank, 2014) fills the gap timely.

Cadastral surveyor is always an active participant in the field of land administration. In this project, we evaluate the cadastral survey system instead of a land administration system. As an indispensable function, how well the cadastral survey and mapping activities meet the demands of the land industry and the society is checked. Cadastral surveyor is the key service provider in a cadastral survey system. Their opinions and judgments are required to be summarized and analyzed.

To evaluate the design of each individual cadastral survey system needs extensive resources and exhaustive research on every perspectives of each specific system. Evaluation on the performance of a system is more practical and widely applied in the field of cadastre and land management (Haldrup and Ktubkjaer, 2013). In this research project, a set of assessment criteria has been proposed to measure the performance of cadastral survey systems from the technical, economic, legal and institutional perspectives as shown in Figure 1.

The key evaluation criteria on the general fitness of a cadastral survey system are: 1) whether the cadastral survey products are trusted by the land users; and 2) whether the cadastral survey services are widely used by land professions. This set of key evaluation criteria is first summarized by Williamson (2000) in assessing the successfulness of land administration systems. Here, then general assessment scheme is listed in Figure 2.
Case study is the selected methodology to evaluate the performance of individual cadastral survey systems. Here, a pilot study on the current Hong Kong cadastral survey system has been conducted to test the capabilities of established assessment model.

3. PERVIOUSLY ESTABLISHED ASSESSMENT FRAMEWORK

This research project aims to evaluate the general successfulness or fitness of the current cadastral survey systems. A structured assessment framework has been established based on a set of assessment criteria as shown in Figure 1. Here, the contents of the framework are briefly reviewed.

A set of performance indicators is proposed based on four general performance aspects of a cadastral survey system. They are Capability, Cost, Security and Service. Certainly, those performance perspectives are interrelated. In the established assessment, Capability more focuses on the technical performance of the system. Cost highlights the economic performance of the system. Security tests the reliability of the system more from the legal perspective. And the Service evaluates the performance of the institutional arrangements. Assessments on the aspects of Capability and Security are applied to measure the trustability of the current cadastral survey services. Assessments on the aspects of Cost and Service are conducted to test the extensiveness of the current cadastral survey services.

The assessment framework has been build based on a Multi-Criteria Decision Analysis (MCDA) model. Specifically, we adopted one of the most widely applied MCDA, Analytic Hierarchy Process (AHP), as the fundamental analyzing algorithm. This methodology is extensively used in the management level of almost every field (Vaidya and Kumar, 2006) to help people make decisions. In a general AHP based framework, there are three hierarchies: Goal, Criteria and Alternatives. Here, the Goal of the assessment project is an ideal cadastral survey system performance that best meets the demands of its stakeholders. The Criteria are the proposed key performance aspects and indicators of a cadastral survey system. The
Alternatives for each individual cadastral survey system are the Should-be Performance (best-fits current societal requirements) and the Achieved Performance (actually achieved system performance).

Questionnaire survey is the main data collection methodology to acquire opinions from cadastral survey stakeholders on: 1) the relative importance of each criterion; and 2) the performance level of the current system on each criterion. Questions for land surveyors and land stakeholders other than land surveyors are designed based on the same framework. Since stakeholders other than land surveyors normally do not have deep understandings on the detailed performance aspects of the cadastral survey and mapping activities, questions on the sub-criteria set are not required to be asked by them. Figure 3 shows the difference on the contents of questions for land surveyors and land stakeholders.

![Assessment contents for land surveyors and other land stakeholders](image)

Figure 3. Assessment contents for land surveyors and other land stakeholders

Generally, there are two sets of questions are needed to be answered. The first set of questions asks participants on the relative importance of each criterion and the participant’s satisfaction level of current system performance under each criterion. A questionnaire of this set of questions has already been distributed to the Hong Kong land surveyors under the coordination of the Land Surveying Division of the Hong Kong Institute of Surveyors. The second set of questions aims to collect information on the achieved performance of the current Hong Kong cadastral survey system. Compared with the first set of questions, this set of performance review questions aims to evaluate the local cadastral survey system in a closer view based on the same set assessment criteria. Feedbacks will be correlated with previously
collected evaluations on the weights of the assessment criteria and the participants’ satisfaction level on each criterion.

4. THE DESIGN OF PERFORMANCE REVIEW QUESTIONS FOR HONG KONG CADAstral SURVEY SYSTEM

4.1 Backgrounds on the Hong Kong Cadastral Survey System Design

To design a performance review questionnaire for a specific cadastral survey system, understandings on the backgrounds of the system is required. Here, the backgrounds on the Hong Kong cadastral survey system will be briefly introduced.

Hong Kong has a land area around 1100 square kilometers. Most of the population dwells in the highly dense Hong Kong Island, Kowloon Peninsula and the flat land in the New Territories and outskirt islands. New Territories consists more than 80% of the total area of Hong Kong and much of the area are still rural areas. Hong Kong used to be a British Colony before its sovereignty transfer to the People’s Republic of China in 1997. After that, Hong Kong maintains its autonomy as a special administrative region of the People’s Republic of China. The legal system of Hong Kong continues based on the common law that follows the English system.

The Land Registration Ordinance was first enacted in 1844 and still in use to date. Land Titles Ordinance was enacted in 2004 but still not into effect. Strictly speaking, there is no cadastre in Hong Kong. The cadastral system has long been criticized by local land survey industry for its weakness in secure the cadastral survey results and the boundary rights. Enhancements on the functions and capabilities of the local cadastral system are progressively deployed. Yet, there is no cadastre law in Hong Kong. Laws covered on cadastral issues are regarded as insufficient by local land surveyors.

The Hong Kong cadastral system deals with basically land registration and cadastral survey. The contemporary exercised leasehold registration system started in 1842. The purpose of the system is mainly for the transaction of land ownership, and has remained largely unchanged since then. The land register is only an index of the registered documents and the property may be subjected to unregistered interests. The land register and memorial are kept in database and lease documents are stored in scanned image files by the Land Registry. The Survey and Mapping Office of the Lands Department keeps the graphic components of the cadastral survey records.

4.2 Previously Collected Assessment Elements

Currently, the established assessment framework mainly collects opinions from local land surveyors. Those land surveyors are divided into three groups: Public Sector (land surveyors from public sector), Private Sector (land surveyors from private sector) and Young Surveyor.
The collected results show their recognition on the relative importance of the performance aspects of the Hong Kong cadastral survey system. Also their satisfaction level on the current achieved performance is assessed. Figure 4 shows the flowchart of these two assessment elements.

As shown in Figure 4, *Element 1* asks assessor to give his/her judgements on the relative importance of every pair of assessment criteria. By standard AHP weights determination algorithm (Satty, 1980), these pairwise comparisons forms the weights or relative importance of each performance aspects in constitution of a desired cadastral survey system performance. *Element 2* collects opinions on the fulfillment level of the current system under each performance indicators. Both these two assessment elements are focused on the generalized satisfaction perception on the cadastral survey system performance. A further step to collect actual datasets on the performance of current cadastral survey system is essential to explorer the development of the system and shed the lights on further system enhancements. Thus a set of performance review questions are designed to meet this purpose.

### 4.3 Contents on the Designed Performance Review Questionnaire
Performance questions are designed under four proposed performance aspects: Capability, Cost, Security and Service. Those selected questions are attached to the established performance indicators of the cadastral survey system. Ideally, more questions attract more information to be collected on the system performance. In practice, more questions in a questionnaire often lead to a less feedback rates. Thus, to balance this, only highly relevant survey questions are listed in the final questionnaire. Overall, twenty multiple choice questions are proposed in this performance review questionnaire to collect actual performance datasets that relevant to the assessment criteria. All those questions are available online (http://goo.gl/forms/qJxD8xS4s6). Here, the general dimensions are briefly discussed.

4.3.1 Performance Questions on Capability

There are three sub-criteria under Capability: Plan Accuracy, Surveying Technology, and System Automation. Plan Accuracy intends to measure the positional accuracy of the currently produced cadastral survey plans. Surveying Technology measures the technical capability and efficiency in survey and mapping required rights, responsibilities and restrictions by currently adopted surveying methodology. System Automation measures the automation level of the cadastral survey system with a focus on the database and data model approach.

4.3.2 Performance Questions on Cost

There are three sub-criteria under Cost: Customer Cost, System Maintenance, and Time Efficiency. Customer Cost measures the individual burden to use the cadastral survey services. System Maintenance measures the government burden in maintaining the current cadastral survey operations. Time Efficiency considers the cost in time dimension by measuring the time efficiency on using or providing cadastral survey services.

4.3.3 Performance Questions on Security

There are three sub-criteria under Security: Boundary Reliability, Legal Basis, and Survey Regulation. Boundary Reliability measures the stability of the boundary system and efficiency of the currently surveyed boundaries. Legal Basis intends to examine the performance of the updated legislation for the operation of cadastral survey services and authorization of legal boundary for surveying. Survey Regulation measures the appropriateness of the technical and administrative guidance for the cadastral survey industry.

4.3.4 Performance Questions on Service

There are three sub-criteria under Service: Product Applicability, Professional Competence, and User Perspective. Product Applicability measures the level of adopting cadastral survey outputs by land professions and the involvement of those products for further system development. Professional Competence considers the efficiency of professional services in fulfilling the requirements of the system end-users; it also aims to test the appropriateness of current licensing and practicing system for the cadastral surveyors. User Perspective measures the quality of the cadastral survey outputs from the perspective of system end-users.
5. IMPLEMENTATION OF QUESTIONNAIRE SURVEY AND FURTHER STEPS

Under the coordination of the Land Surveying Division (LSD) of The Hong Kong Institute of Surveyors (HKIS), this performance review questionnaire has been distributed to the local land surveyors in both public sector and private sector. A consultancy panel is established. These panel members are mainly from the Council Member of the LSD of the HKIS. Currently, 18 completed questionnaires are collected through interview of the panel members individually.

When sufficient feedbacks are collected from the local cadastral survey industry, a correlation study between the newly collected performance information and previously collected scores will be conducted. Figure 5 shows an example of further correlation studies.

Figure 5. Example of further correlation study
6. CONCLUSIONS

Performance review facilitates an organization to meet its user demands and achieve planned goals. Evaluation on the performance of a cadastral survey system helps decision makers understand the current development of cadastral survey industry and the way forward to enhance its performance. This study based on a previously established structured performance assessment model developed a set of appraisal questions for Hong Kong cadastral survey stakeholders to review the system performance. With sufficient feedbacks, robust correlations between the newly collected performance information of local cadastral survey system and previously collected performance scores can be established. The proposed results aim to reflect the current status of the Hong Kong cadastral survey system in fulfilling its internal land surveying responsibilities and external duties in supporting a fit-for-purposes land administration system and a sustainable society.

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