

Difficulties in executing the Mandatory Building Inspection Scheme (MBIS) for existing private buildings in Hong Kong

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Highlights

- Hong Kong is a densely populated city with a plethora of ageing buildings around.
- This paper aims to elucidate the profound difficulties in executing MBIS.
- An industry-wide survey was launched to solicit various views and opinions.
- MBIS is an effective strategy in resolving the problem of building deterioration.

ABSTRACT

Hong Kong is a highly developed and densely populated city with a multitude of ageing buildings. To maintain the Hong Kong's ageing building stock properly and promote public safety in a sustainable manner, it is crucial to ensure that building owners will take up the responsibility for inspecting and repairing their own properties on a regular basis. The Mandatory Building Inspection Scheme (MBIS) has been regarded as an effective measure in resolving the neglected building maintenance problems. However, there will also be some major difficulties encountered during implementation. This paper aims to investigate the genuine difficulties in executing MBIS for old private buildings in Hong Kong, based on an industry-wide empirical questionnaire survey. The survey findings reflected that the most profound difficulties in implementing MBIS include: (1) Difficulty in co-ordinating the individual flat owners for carrying out building inspection and necessary repair and maintenance works; (2) Disagreements or disputes amongst individual flat owners, owners' corporation or property management company will hinder the implementation process; and (3) Lack of property owners' initiative or owners' co-operation. After determining the key difficulties of MBIS, the research study would be significant to generate valuable insights into developing effective recommendations or measures for alleviating the barriers to MBIS success in future execution.

Keywords: Building inspection; Building management; Building safety; Difficulties in building repair and maintenance; Old private buildings; Hong Kong

1. Introduction

The urban decay problem is becoming serious in Hong Kong. The condition of the building will be deteriorated with an increase in building age. For those buildings over 30 years old, they usually suffer from different building defects such as bulging or falling off of concrete with rusty steel reinforcement bars exposed, water leakage, structural or non-structural cracking, etc. If these defects cannot be identified at their early stages and rectified promptly, minor defects will be conducive to serious problems or disastrous consequences. In fact, those poorly maintained buildings are attributed to a series of causes such as the difficulties encountered when implementing maintenance works and the lack of a comprehensive and effective maintenance scheme (Leung and Yiu, 2004). Hence the building maintenance problems are becoming further aggravated, and a long-term holistic measure should be launched by the government without any delay.

The Government of the Hong Kong Special Administrative Region (SAR) has launched a plethora of incentive schemes to encourage property owners to undertake proper building maintenance to their buildings. However, a sustainable strategy to address the issues of building ageing and neglect has not yet been executed. The government launched a two-stage public consultation in 2003 and 2005 respectively, regarding the legislative measures of building management and maintenance. The Mandatory Building Inspection Scheme (MBIS) is one of the proposed effective measures to resolve the problem of building neglect and deterioration in Hong Kong. The public consultation reflected that the scheme is generally accepted and supported by the community at large. Thus, an industry-wide empirical investigation of the key difficulties of MBIS is considered to be important and timely to identify any deficiencies of MBIS, and then to ensure its effective implementation. The objectives of this paper are to review the current situation of building repair and maintenance problems in Hong Kong, present the key findings of an empirical questionnaire survey on the major difficulties of MBIS; and compare the difficulties in implementing MBIS between various respondent groups. The research outcomes of this study could generate some useful insights, optimize the implementation procedures and facilitate a successful implementation of MBIS in Hong Kong.

2. Major problems besetting building repair and maintenance

In Hong Kong, most of the domestic buildings are high-rise buildings of framed reinforced concrete. Before the 1960s, these domestic buildings were normally below six storeys high. With the improvement of construction technology, domestic buildings of about 20 storeys have been built since the 1970s. Currently, high-rise buildings of more than 40 storeys have become very common in the Hong Kong property market. A small object falling from this height of the buildings, such as a mosaic tile or concrete debris from the external wall, may result in serious accidents and even fatal consequences (Leung and Yiu, 2004).

Ageing buildings do not necessarily pose a problem unless they have deteriorated because of inadequate care, repair and maintenance (Chan, 2004). The lack of a clearly established government policy on building management and maintenance, together with the inadequacy of building care among building owners, lead to the problems of building neglect (Yau, Ho, Chau and Lau, 2009). Moreover, as a result of the multi-ownership arrangement of multi-storey buildings in Hong Kong, the maintenance works for the common parts such as entrance lobbies, access corridors and staircases are always hampered (Lai and Chan, 2004; Yau, Ho and Chau, 2008). Fung (2008) advocated the primary reasons for building neglect as

the initiatives of owners, owners' ignorance, financial difficulties and absence of property management corporations. Chan (2008) perceived that the majority of owners neglect their legal responsibilities and their building care culture is weak. Lau (2011) believed a significant problem to be a multitude of so-called "three no's" buildings in several old districts. The "three no's" include "no management", "no maintenance" and "no owners' corporation". Therefore, the problems with building repair and maintenance are further aggravated; and a long-term holistic and practical policy should be developed to mitigate the prevailing deteriorating situation.

The incentive towards the building owners to carry out proper maintenance to their buildings has been increased gradually (Housing, Planning and Lands Bureau, 2006). However, it should be noticed that the Building Management Ordinance (Chapter 344), Buildings Ordinance (Chapter 123), Deed of Mutual Covenant and Government Lease have stipulated that it is the duty of private building owners to maintain their buildings in a good and sustainable repair and condition (Chick, 2003). Thus, there should be a scheme in place to remind and ensure the owners to take up their responsibility for the upkeep of their buildings in the long run. Yau (2010) pointed out that the owner may also participate in building care with a view to better living environment and healthier lives. Fong (2008) pointed out that if the life of the building can be prolonged, it can save money incurred from repair and maintenance works in the long run.

Siu (1998) delivered a guidance paper on proposing a building safety inspection system for fire safety issues in existing buildings. Wright (1999) identified facade inspection regulations for six cities located in the United States including New York City, Boston, Chicago, Ohio, Detroit and Columbus in order to illustrate the significance of the facade inspection. They all share the same focus which is the items that are essential to safety of both occupants and the public. Other than the financial constraint, a lack of relevant knowledge and skills are also recognised as another common hindrance to building care actions (Kangwa and Olubodun, 2003). Therefore, the government should provide adequate technical and supporting services such as consultation centres and briefing sessions to individual property owners when implementing MBIS. Furthermore, Chen and Webster (2005) advocated that co-ordination and negotiation process are both time-consuming and costly, therefore the owners should be properly convened and well co-ordinated during the execution of MBIS.

3. Prevailing status of building conditions in Hong Kong

The condition of the building will be deteriorated while the building age increases due to the fair construction quality and lack of proper building maintenance practices (Law, 2008). In addition, Chan and Morris (1997) also pointed out the construction speed of buildings was achieved at the expense of quality in late 1960s and early 1970s; it is consistent with the supposition of Leung and Yiu (2004) – the private buildings constructed in the 1959-1965 and 1971-1975 cohorts were vulnerable to premature deterioration of reinforced concrete because of the high chloride content of concrete used for their construction. Furthermore, Hui, Wong and Wan (2008) believed that the hot and wet climate in Hong Kong is directly associated with the old age of the buildings, together with the less stringent statutory requirements and poor quality of construction materials and workmanship, play a role in the ageing trend.

For those buildings over 30 years old, the emergences of various building defects such as concrete spalling, water leakage, structural or non-structural cracking are commonly observed. Minor defects can generate enormous problems or even catastrophes. The outcomes of building deterioration will cause injuries or fatalities because of the sudden collapse of existing buildings or its structural elements. There are thousands of buildings in Hong Kong that are more than 50 years old. Some of the unfortunate building collapse incidents have recently instigated the alarming need for regular and proper building maintenance throughout the territory of Hong Kong.

Based on the study of Hong Kong 2030 (2001), it was estimated that the number of old buildings will have increased remarkably, particularly the buildings of 30 years old or above of which the number will almost become twice by 2016. According to the Housing, Planning and Lands Bureau (2006), there are about 39,000 private buildings in Hong Kong, and approximately 13,000 of which are over 30 years old. Furthermore, the number will surge to 22,000 within ten years' time by 2018, conducive to a trend of fast decaying building stock. With reference to the Buildings Department (2015), more than nine thousands of statutory orders / notices were issued by the Buildings Department to demolish, repair or investigate the defective buildings or its elements within the period from 2006 to 2014. The large number of statutory orders / notices revealed the serious situation of the dilapidated buildings in Hong Kong (Table 1). Thus, a long-term holistic mandatory building inspection scheme like MBIS needs to be promulgated and executed by the government with the purpose of improving the prevailing status of deteriorating building conditions and enhancing the overall building safety in Hong Kong as soon as possible.

Table 1. Statutory orders / notices issued on dangerous buildings, investigation on buildings defects and defective drains for existing buildings in Hong Kong (Buildings Department, 2015).

Year	Demolition	Building repairs	Investigation on buildings defects	Defective drainage repairs / investigation	Total
2006	14	636	47	344	1,041
2007	2	690	20	371	1,083
2008	11	459	22	435	927
2009	8	530	81	524	1,143
2010	13	1319	326	588	2,246
2011	6	394	44	352	796
2012	1	307	182	321	811
2013	12	330	35	305	682
2014	10	213	12	305	540
Total number of statutory orders / notices issued (2006-2014)					9,269

4. Mandatory Building Inspection Scheme (MBIS)

In order to engage the whole community in putting into a practical and long-term measure to resolve the building neglect and deterioration problem, the Housing, Planning and Lands Bureau (HPLB) conducted a two-stage public consultation on Building Management and Maintenance and the Proposed Mandatory Building Inspection in 2003 and 2005, respectively (Development Bureau, 2010). The milestones of the development of MBIS are illustrated in Figure 1.

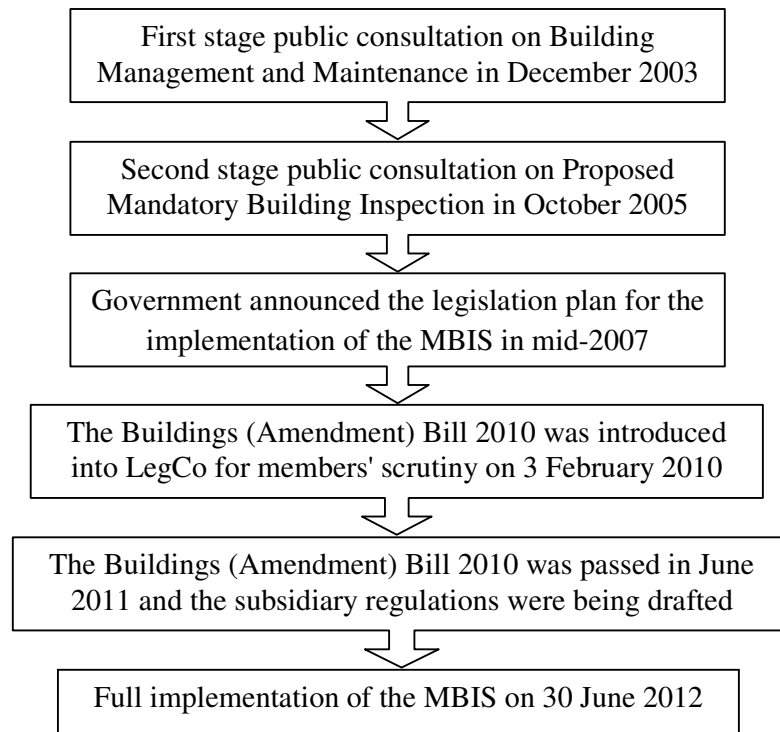


Figure 1. Evolution of the Mandatory Building Inspection Scheme (MBIS) in Hong Kong.

4.1 Target buildings and inspection cycle

To uphold the good conditions of aged buildings and ensure public safety, owners of buildings aged 30 years old or above (except domestic buildings not exceeding 3 storeys) are compulsory to appoint a Registered Inspector (RI) to carry out the prescribed inspection and supervise the prescribed repair works found necessary of the common parts, external walls and projections or signboards of the buildings once every 10 years under the initiation of MBIS from June 2012. Domestic buildings not exceeding 3 storeys will not be covered by the scheme as they pose a lesser risk to public safety.

4.2 Scope of building inspection

Under MBIS, the building elements that are important to public safety should be included in the building inspection process. The RI appointed by owners of a building shall carry out inspection on four major building elements: (1) External elements and other physical elements; (2) Structural elements; (3) Fire safety elements; and (4) Drainage system; and identify any unauthorised building works in the common parts and on the exterior of the building. The RI is also responsible for supervising the prescribed repair works after inspection. The details of the inspection items were documented in a recent journal article by Chan, Hung, Chan and Lo (2014) for perusal. Up to the end of April 2014, the Buildings Department has issued statutory notices of 1,600 private buildings selected for mandatory building inspection, and 200 certification letters have been received after completing the prescribed inspection and the necessary repair works of the selected buildings so far.

5. Research methodology

An industry-wide empirical questionnaire survey was launched from March to April of 2013 in Hong Kong to solicit the views and opinions of various key project stakeholders on the major difficulties in implementing MBIS within the construction and property management community. There are in total 16 potential difficulties of MBIS sought from the relevant literature review and they formed the basis of the survey questionnaire, followed by a “pilot” survey with some well-experienced experts in new building construction or building repair and maintenance to verify the adequacy of items and clarity of the survey form. So the final survey form was discerned as sufficient, clear and appropriate for further distribution.

On the survey questionnaire, respondents were requested to rate their levels of agreement against each of the identified difficulties based on a five-point Likert scale from 1 to 5, where “1” represented “strongly disagree”, “3” = “neutral or no comment” and “5” denoted “strongly agree” on the statements. Respondents were also invited to propose and rate any other unmentioned difficulties on the survey form according to their personal discretion and actual experience, but eventually no new difficulties were proposed by them.

5.1 Collection of research data

In this questionnaire survey, the target respondents included those industrial practitioners who are working for the relevant government works departments, related non-government client organizations, private property developers, project consultants, contractors and property management companies in Hong Kong. The target survey respondents from relevant government works departments including the Buildings Department (BD), Architectural Services Department (ArchSD) and Housing Department (HD) were randomly selected from the website of the “Telephone Directory of the Government of the Hong Kong Special Administrative Region and Related Organizations”. As the construction professionals from these three departments including architects, engineers and surveyors are most likely involved in MBIS or building maintenance works. Self-administered questionnaires were sent out to different client organizations including both the public sector and the private sector as well. The public client organizations encompass the three mentioned departments, the Hong Kong Housing Society (HKHS) and the Urban Renewal Authority (URA). The target private property developers, project consultants, contractors and property management companies were selected through the personal network and contact lists from the past research projects of the researchers.

A total of 852 sets of self-administered blank survey questionnaires were distributed to individual target respondents by means of postal mail, electronic mail and hardcopy distribution by hand. All the potential key project stakeholders who will be involved in MBIS from relevant government works departments, prospective private property developers, consulting firms of various disciplines, main contractors, subcontractors and property management companies had been comprehensively included in the list of target respondents of the questionnaire survey. They comprised of architects, building surveyors, structural engineers, property services managers, maintenance surveyors, technical officers, quantity surveyors and project managers. Therefore, their feedback and views collected could substantially represent the construction and building maintenance industry on the execution of MBIS. Finally, 340 completed survey questionnaires were returned for statistical analysis leading to a response rate very close to 40%.

One of the objectives of this paper is to compare the respondents' level of agreement on the 16 potential difficulties sought according to their current residences since MBIS solely targets at the old private buildings rather than the public premises. The categorization was conducted as follows: "Owned private premises" and "Rented private premises" will be grouped into the "Private group"; and "Owned public flats for sale" and "Rented flats in public housing" will be grouped into the "Public group". According to the survey results, nearly two-thirds (66.5%) of the respondents lived in private premises while 26.1% lived in public estates and the remaining 7.4% were excluded from these two groups.

All the respondents were experienced professionals in either "new works" or "building management or repair/maintenance" implying that they are able to provide reliable data and genuine opinions to the research on MBIS (Table 2). Over two-thirds of the respondents had acquired over 5 years of work experience in 'new works' while almost one-third of them had derived less than 5 years of work experience in the construction industry. More than 45% of the respondents had gained over 5 years of work experience in "building management or repair/maintenance" (Table 2). Since all the respondents possessed direct hands-on experience in either the new construction or repair/maintenance sector with different experience levels, their opinions and feedback gleaned from the questionnaire survey would be reliable and representative of the survey population, and revealed the major difficulties in executing MBIS. The survey data were processed and analyzed by means of the Statistical Packages for the Social Sciences (SPSS).

5.2 Statistical techniques for data analysis

Data analysis is an important process to turn raw data into useful information by quantitative methods so meaningful and significant conclusions can be drawn. Various statistical tools, as previously adopted by Chan, Chan and Choi (2010), were applied in this research including the Cronbach's alpha reliability test, descriptive statistics, Kendall's concordance analysis, Spearman's rank correlation test and factor analysis, to test for consistency and compare the perceptions within each group or between different groups of survey respondents on the difficulties of MBIS.

6. Presentation and discussion of survey findings

Results derived from the analysis of empirical questionnaire survey were cross-referenced to the extant literature wherever appropriate. In this study, the Cronbach's alpha coefficient for the sixteen rated difficulties of MBIS was 0.827 which was much higher than threshold value of 0.70 according to Santos (1999) and Norusis (2002). It was demonstrated that the five-point Likert scale adopted for measuring the MBIS difficulties is reliable and internally consistent among the responses at the 5% significance level.

Table 2. Background profiles of the survey respondents.

Information about respondents	Number of respondents	Percentage
A. Type of organization		
1. Public Client	80	23.5%
2. Private Client	50	14.7%
3. Consultant	85	25.0%
4. Contractor	96	28.2%
5. Property Management Company	29	8.5%
Total	340	100%
B. Years of work experience in new works		
1. No experience	24	7.1%
2. Less than 5 years	86	25.3%
3. 5-10 years	68	20.0%
4. 11-15 years	47	13.8%
5. 16-20 years	31	9.1%
6. More than 20 years	84	24.7%
Total	340	100%
C. Years of work experience in building management or repair/maintenance		
1. No experience	72	21.2%
2. Less than 5 years	112	32.9%
3. 5-10 years	46	13.5%
4. 11-15 years	37	10.9%
5. 16-20 years	29	8.5%
6. More than 20 years	43	12.6%
7. Missing	1	0.3%
Total	340	100%
D. Type of current residence		
1. Private Group	226	66.5%
2. Public Group	89	26.1%
3. None of the above	25	7.4%
Total	340	100%

The key difficulties in implementing MBIS in Hong Kong were evaluated from two different perspectives of the “Private group” and “Public group”. The mean scores of each difficulty for each respondent group were calculated and each difficult was ranked in descending order of the mean scores with a certain group as portrayed in Table 3.

Table 3. Results of the ranking and Kendall's concordance test for the major difficulties in executing MBIS (categorized by current residence).

No.	Difficulties of MBIS	All respondent group		Private group		Public group	
		Mean	Rank	Mean	Rank	Mean	Rank
6	Difficulty in co-ordinating the individual flat owners for carrying out building inspection and necessary repair and maintenance works (e.g. without owners' corporation).	4.14	1	4.15	1	4.17	1
8	Disagreements or disputes amongst individual flat owners, owners' corporation or property management company will hinder the implementation process.	3.89	2	3.92	2	3.89	3
4	Lack of property owners' initiative or owners' co-operation.	3.87	3	3.84	3	3.97	2
3	Difficult for the property owners to afford the building repair and maintenance costs.	3.76	4	3.72	4	3.88	4
2	Difficult for the property owners to afford the building inspection costs.	3.66	5	3.57	7	3.85	5
7	Insufficient guidelines towards the property owners on the implementation of any necessary repair and maintenance of buildings after inspection (e.g. without "Guidelines for Property Owners").	3.65	6	3.62	5	3.78	6
5	Insufficient government financial and technical assistance.	3.60	7	3.58	6	3.60	7
15	Insufficient promotion on MBIS within the community.	3.48	8	3.46	8	3.57	9
10	Difficulty in carrying out prosecution by the Buildings Department may hinder the implementation process of MBIS.	3.43	9	3.37	9	3.58	8
9	Corruption may hinder the implementation process of MBIS from inspection stage to completion of maintenance works.	3.40	10	3.35	10	3.44	11
16	Insufficient control over the professional competence and quality of works of contractors.	3.36	11	3.26	11	3.51	10
11	Inadequate professionals as the potential registered inspectors (RIs) in the market for executing building inspection.	3.25	12	3.17	12	3.42	12
1	Difficult for the Buildings Department to select the pool of suitable target buildings for carrying out mandatory inspection.	3.10	13	2.99	13	3.35	13
12	Inadequate contractors as the potential registered contractors (RCs) in the market for executing necessary building repair and maintenance works after inspection.	3.00	14	2.9050	14	3.16	14
13	Professionals are not willing to participate as the registered inspectors (RIs) for executing building inspection.	2.96	15	2.9009	15	3.01	15
14	Contractors are not willing to participate as the registered contractors (RCs) for executing necessary building repair and maintenance works after inspection.	2.70	16	2.59	16	2.90	16
Number (N)		299		197		85	
Kendall's coefficient of concordance (W)		0.186		0.214		0.149	
Actual calculated chi-square value		835.459		633.318		190.404	
Critical value of chi-square from table		25.00		25.00		25.00	
Degree of freedom (df)		15		15		15	
Asymptotic level of significance		0.000		0.000		0.000	

H_0 = Respondents' sets of rankings are unrelated (independent) to each other within each group
Reject H_0 if the actual chi-square value is larger than the critical value of chi-square from table

Note: Items were rated on a 5-point Likert scale (1 = Strongly Disagree; 3 = Neutral and 5 = Strongly Agree).

6.1 Agreement of respondents within each survey group

The various difficulties of MBIS were assessed from two different perspectives of the “Private group” and “Public group”. As shown in Table 3, the Kendall’s coefficient of concordance (W) for the rankings of difficulties was 0.186, 0.214 and 0.149 for “All respondent group”, “Private group” and “Public group” respectively. The computed W’s were all statistically significant with a significance level of 0.000.

Since the number of attributes considered were more than seven, the chi-square value would be referred to rather than the W value (Chan, Chan and Choi, 2010). According to the degree of freedom ($16 - 1 = 15$) and the allowable level of significance (5%), the critical value of chi-square from table was sought to be 25.00 (Siegel and Castellan, 1988). For all the three groups (i.e. all respondent group, private group and public group), the actual computed chi-square values were all extremely larger than the critical value of chi-square of 25.00. They included 835.459, 633.318 and 190.404 for “All respondents”, “Private group” and “Public group” respectively (Table 3). This result indicates the null hypothesis that “Respondents’ sets of rankings are unrelated (independent) to each other within a certain group” has to be rejected. Consequently, there is sufficient evidence to conclude that there is significant degree of agreement among the respondents within each survey group and all respondents on the rankings of the difficulties of MBIS. This concordance test ensures the data and opinions collected from the questionnaire survey to be valid and consistent for further analysis.

6.2 Overall ranking of the difficulties of MBIS

The mean values for the difficulties as rated by all respondents ranged from 2.70 to 4.14. For those scored by respondents living in private premises, the mean value ranged from 2.59 to 4.15 while those rated by respondents living in public estate flats the mean value spanned from 2.90 to 4.17. The results showed that the difference of the mean values for “Private group” ($4.15 - 2.59 = 1.56$) is greater than “Public group” ($4.17 - 2.90 = 1.27$) in considering all the 16 perceived difficulties collectively; it reflects that the respondents living in private premises exhibit a larger disparity of their opinions on those difficulties among themselves. In general, all respondents agreed with the top-ranked 13 out of 16 identified difficulties in implementing MBIS as their mean values were above 3 (spanning from 3.10 to 4.14) and close to each other which were found skewed towards the “agree” category. Hence the respondents were agreeable to most of the difficulties elicited in general but with different levels of agreement only.

Item 6 “Difficulty in co-ordinating the individual flat owners for carrying out building inspection and necessary repair and maintenance works (e.g. without owners’ corporation)” was ranked as the top potential difficulty by all the respondents with overall mean value equal to 4.14. The fragmented ownership was discerned as a major barrier / hurdle to the launch of the inspection and maintenance works especially the buildings without owners’ corporation. Yip and Forrest (2002) pointed out that the formation of owners’ corporation is essential in handling building maintenance problems with the dilapidated buildings especially in Hong Kong. The repair and maintenance works for the common parts are often hampered due to the multi-ownership of multi-storey private buildings (Lai and Chan, 2004; Yau, Ho and Chau, 2008).

Item 8 “Disagreements or disputes amongst individual flat owners, owners’ corporation or property management company will hinder the implementation process” was ranked as the second most significant difficulty by “All respondent group” (mean score of 3.89), the second by “Private group” (mean score of 3.92) and the third by “Public group” (mean score of 3.89). In case of any non-consensus or disputes arising from the building management and maintenance process amongst those key stakeholders (e.g. the recruitment process for a competent Registered Inspector or a Registered Minor Works Contractor), it would be difficult to kick start the prescribed inspection items and repair works under MBIS. Thus, a Dispute Resolution Mechanism was also developed for resolving this kind of disputes between individual homeowners and owners’ corporation or their own property management company (Housing, Planning and Lands Bureau, 2007).

Item 4 “Lack of property owners’ initiative or owners’ co-operation” was ranked as the third top difficulty by “All respondents group” (mean score of 3.87), the third by “Private group” (mean score of 3.84) and the second by “Public group” (mean score of 3.97). Many property owners ignore their legal responsibility for regular building repair and maintenance towards their living premises, and their building care culture is very weak, as advocated by Chan (2008). They always think that there would be no direct tangible benefits accrued from proper management and maintenance of building stock, and hence unwilling to place much attention to this issue. Furthermore, Fung (2008) believed the initiatives of property owners and owners’ ignorance as two of the profound reasons associated with building neglect, and private homeowners often take a passive “wait-and-see” attitude until the emergence of serious problems (Chan, 2004).

6.3 Comparison of survey responses between private group and public group

Having established the internal consistency of the rankings within the respondent groups, the next stage of analysis was to test whether there is any significant agreement or disagreement on the rankings of various difficulties of MBIS between the survey groups, which is indicated by the Spearman’s rank correlation coefficient (r_s) using the SPSS software package (SPSS, 2002). The correlation coefficient of the rankings between the “Private group” and the “Public group” on the difficulties of MBIS was 0.982 with a significance level of 0.000 as indicated in Table 4. Therefore, the null hypothesis has to be rejected. There is adequate evidence to conclude that there is significant correlation between the “Private group” and the “Public group” on the rankings of MBIS difficulties.

In particular, seven items out of the total 16 received the same ranks. Examples include Item 6 “Difficulty in co-ordinating the individual flat owners for carrying out building inspection and necessary repair and maintenance works (e.g. without owners’ corporation)”, Item 3 “Difficult for the property owners to afford the building repair and maintenance costs”, Item 11 “Inadequate professionals as the potential registered inspectors (RIs) in the market for executing building inspection” and Item 1 “Difficult for BD to select the pool of suitable target buildings for carrying out mandatory inspection”, being ranked identical as the 1st, 4th, 12th and 13th respectively by both private group and public group as discerned in Table 3, demonstrating that the respondents from the private group and the public group shared unanimous perceptions particularly on the rankings of these seven difficulties. The rankings of other nine difficulties were also found to be very close to each other with the ranking variance of just one place except Item 2 “Difficult for the property owners to afford the building inspection costs”. So in general, this result implies that both the respondents of the

“Private group” and the “Public group” shared significant level of agreement on the rankings of major difficulties of MBIS.

Table 4. Results of the Spearman’s rank correlation test between the private group and public group on the key difficulties in executing MBIS.

Comparison of rankings	r_s	Significance level	Conclusion
Private group vs Public group	0.982	0.000	Reject H_0 at 5% significance level

where H_0 = No significant correlation on the rankings between two groups

H_a = Significant correlation on the rankings between two groups

Reject H_0 if the actual significance level (p-value) calculated is less than the allowable value of 5%

6.4 Factor analysis of the difficulties of MBIS

Factor analysis was subsequently adopted to investigate the structure of interrelationships between the large number of variables by identifying a set of underlying factors (Hair, Anderson, Tatham and Black, 2010). It is considered as a statistical technique to define a relatively small number of individual factors which can be used to represent the relationships among sets of many interrelated variables. After conducting factor analysis, the 16 individual MBIS difficulties were consolidated into four "underlying" grouped factors. The total percentage of variance explained by each factor was examined to determine how many factors would be required to represent that set of data.

Principal factor extraction with Promax rotation and Kaiser normalisation was launched through the SPSS FACTOR program on the 16 MBIS difficulties from a sample of 340 responses. Promax is one of the most commonly used oblique rotation methods (DeCoster, 1998; Biber, 2009) which has been adopted by a multitude of researchers (Lam, Chan and Chan, 2008; Karna, Junnonen and Sorvala, 2009; Chan, Chan, Chan and Lam, 2012). Therefore, the Promax rotation method was finally applied to this study for further discussion. The results of factor analysis are shown in Table 6. The total variance explained by each factor was listed in the column under “factor loading”. The percentage of variance explained and the cumulative percentage of variance explained are also indicated in Table 6.

There were some stipulated requirements that have to be met before conducting factor analysis. As advocated by Lingard and Rowlinson (2006), the sample size is considered sufficient to carry out factor analysis as it complies with the ratio of 1:5 for the number of variables involved to necessary sample size, i.e. 16 MBIS difficulties multiplied by 5 samples required for each factor = at least 80 samples for assuring sufficient sample size to proceed with factor analysis. The number of samples collected in this study is 340 which met the sample size requirement. Various statistical tests were also conducted to examine the appropriateness of factor analysis for factor extraction. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Barlett’s test of sphericity for the extraction factors can be used. The acceptance level of KMO value is indicated in Table 5 (Field, 2005).

Table 5. Acceptance level of KMO value (Field, 2005).

KMO value	Degree of common variance
0.90-1.00	Excellent
0.80-0.89	Good
0.70-0.79	Middling
0.60-0.69	Mediocre
0.50-0.59	Poor
0.00-0.49	“Forget it”

The KMO value for factor analysis in this study is 0.784 which shows a “middling” degree of common variance and is well above the acceptable threshold of 0.50 (Norusis, 1993). The Barlett’s test of sphericity is used to test the hypothesis that the correlation matrix is an identity matrix, which indicates that there is no relationship among the items (Pett, Lackey and Sullivan, 2003). The value of the test statistic for Barlett’s sphericity is large (chi-square value = 1495.612) and the associated significance level is small (p-value = 0.000), implying that the population correlation matrix is not an identity matrix. The Cronbach’s α reliability coefficient was used for checking internal consistency (reliability) between 0 and 1, based on the average inter-item correlation. The usual rule is that if the alpha value is larger than 0.70, it can be concluded that the adopted measurement scale is reliable (Norusis, 1993). In this study, the overall alpha value for the 16 individual difficulties of MBIS was calculated as 0.827, implying that there is good internal consistency (reliability) in terms of the correlations among the 16 difficulties, and the adopted measurement scale is reliable. As the requirements of KMO value and the Barlett’s test of sphericity are both achieved, it can therefore be proved that factor analysis was suitable for this research and can be carried out with reliability and confidence.

Altogether, four underlying factors were extracted in this case, representing 76.7% of the total variance in responses well above the minimum requirement of 60% according to Malhotra (1996) and Hair, Anderson, Tatham and Black (2010). It is also much larger than other values derived by Akadiri and Olomolaiye (2012) of 53%; Ward, McCreery, Ritzman and Sharma (1998) of 54%; together with Akintoye and Main (2007) of 54%. SPSS drops the factors from “5” to “16” as their Eigenvalues are less than 1.0. It means that they are less influential than the four observed underlying clustered factors. The 16 original MBIS difficulties were all represented in one of these four underlying grouped factors. It is observed that the factor loadings and the interpretation of the individual factors extracted were reasonably consistent and sufficient.

Table 6. Factor structure of principal factor extraction and promax rotation on the 16 difficulties of MBIS.

No.	Difficulties of MBIS	Factor Loading	Eigenvalue	Percentage of variance explained	Cumulative percentage of variance explained
<i>Factor 1. Inadequate contractors or professionals for executing building maintenance works and building inspection</i>					
14	Contractors are not willing to participate as the registered contractors (RCs) for executing necessary building repair and maintenance works after inspection.	0.830	4.497	38.108	38.108
12	Inadequate contractors as the potential registered contractors (RCs) in the market for executing necessary building repair and maintenance works after inspection.	0.752			
13	Professionals are not willing to participate as the registered inspectors (RIs) for executing building inspection.	0.728			
11	Inadequate professionals as the potential registered inspectors (RIs) in the market for executing building inspection.	0.652			
<i>Factor 2. Heavy financial burden of property owners</i>					
2	Difficult for the property owners to afford the building inspection costs.	0.884	2.210	23.812	61.921
3	Difficult for the property owners to afford the building repair and maintenance costs.	0.860			
1	Difficult for BD to select the pool of suitable target buildings for carrying out mandatory inspection.	0.537			
<i>Factor 3. Insufficient guidelines and government support towards property owners</i>					
7	Insufficient guidelines towards the property owners on the implementation of any necessary repair and maintenance of buildings after inspection (e.g. without "Guidelines for Property Owners").	0.773	1.265	7.909	69.830
15	Insufficient promotion on MBIS within the community.	0.732			
5	Insufficient government financial and technical assistance.	0.610			
16	Insufficient control over the professional competence and quality of works of contractors.	0.442			
<i>Factor 4. Difficulties in prosecution and co-ordination under MBIS</i>					
10	Difficulty in carrying out prosecution by BD may hinder the implementation process of MBIS.	0.704	1.099	6.870	76.700
6	Difficulty in co-ordinating the individual flat owners for carrying out building inspection and necessary repair and maintenance works (e.g. without owners' corporation).	0.669			
4	Lack of property owners' initiative or owners' co-operation.	0.591			
8	Disagreements or disputes amongst individual flat owners, owners' corporation or property management company will hinder the implementation process.	0.578			
9	Corruption may hinder the implementation process of MBIS from inspection stage to completion of maintenance works.	0.559			

Notes:

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy: 0.784;

Barlett's test of sphericity:

approximate χ^2 value: 1495.612;

degree of freedom: 120;

significance level: 0.000;

Cronbach's α reliability coefficient: 0.827

6.4.1 Factor 1 - Inadequate contractors or professionals for executing building maintenance works and building inspection

Factor 1 consists of four MBIS difficulties focusing on the potential inadequacy and unwillingness of related professionals in the market such as contractors and inspectors, to execute necessary building repair and maintenance works, together with building inspection. Under MBIS, Registered Inspectors (RIs) should be appointed to conduct the prescribed building inspection and supervision of the prescribed repair works, and Registered Contractors (RCs) should be employed to carry out the necessary rectification and repair works which are identified after building inspection (Buildings Department, 2012). Both RIs and RCs shall be qualified and registered to undertake the respective works. As the condition of building deterioration in Hong Kong has become very serious and worsening in these years, the demand for relevant professionals and contractors engaged in building inspection and repair works under MBIS is anticipated to be increased substantially year by year.

However, since an unprecedented construction boom of the Ten Major Infrastructure Projects is being observed at different stages of development in town, the construction professionals and major contractors may be more interested and heavily involved in these new-build mega-sized projects rather than in the sector of building repair/maintenance and inspection works which are not discerned as their contemporary core business. Hence qualified professionals or competent contractors in the market may be inadequate or unwilling to undertake the potential volume of prescribed inspections and timely renovations in near future (i.e. 2,000 premises per year) upon the full implementation of MBIS in Hong Kong. So it is recommended that those contractors already enlisted in the register of General Building Contractors under the Buildings Department should also be included in the pool of registered or eligible contractors under MBIS for executing the prescribed building repair and maintenance works to meet the stipulated market demand.

6.4.2 Factor 2 – Heavy financial burden of property owners

This factor comprises three items that are related to the financial burden of property owners towards MBIS and difficulty in selection of suitable target buildings. They include difficulties for the property owners to afford the building inspection costs and the building repair and maintenance costs, and difficult for the statutory body (Buildings Department) to select the pool of suitable target buildings for carrying out mandatory inspection. As most of the property owners who lived in the existing private residential buildings or fragmented ownership buildings are old and low-educated, they may encounter both financial and technical hindrances on carrying out the stipulated inspection and maintenance works for their buildings. The Report on the Public Consultation on Mandatory Building Inspection Scheme (Housing, Planning and Lands Bureau, 2007) had reported that the inspection and maintenance cost is one of the main concerns over conducting building repair and maintenance. Besides, a lack of requisite skills and knowledge are also commonly identified as the constraint to building care actions (Kangwa and Olubodun, 2003).

Yip and Forrest (2002) also pointed out that spending extra financial resources for renovations is burdensome especially apparent in older buildings where senior citizens are living. Numerous assistance measures such as the Mandatory Building Inspection Subsidy Scheme (MBISS) and the Integrated Building Maintenance Assistance Scheme (IBMAS) jointly launched by the Hong Kong Housing Society (HKHS) and the Urban Renewal

Authority (URA) would be useful to provide financial support to the eligible flat owners for paying the inspection fees and repair / maintenance costs under MBIS.

6.4.3 Factor 3 – Insufficient guidelines and government support towards property owners

Four items constitute the elements of Factor 3 regarding the implementation guidelines and support from the government. They include: (1) insufficient guidelines towards the property owners on the implementation of any necessary repair and maintenance of buildings after inspection; (2) insufficient promotion on MBIS within the community; (3) insufficient government financial and technical assistance; and (4) insufficient control over the professional competence and quality of works of contractors. As the execution of MBIS has not yet maturely developed in Hong Kong, the property owners may lack or concern more about the adequacy of guidelines on the procedures of building inspection, repair and maintenance works (i.e. without the "Guidelines for Property Owners"). They may not be fully aware of the promotional materials on MBIS in town and the associated financial and technical assistance from the government. Any ambiguities on the guidelines may hinder the successful implementation of MBIS in practice. Hence, it is suggested to launch more promotions on MBIS towards the general public via various media, and to develop more detailed guidelines on the requirements and standards of building inspection and repair works under MBIS by the government towards the property owners (e.g. Code of Practice for MBIS 2012 Amendments dated on 15 September 2014).

6.4.4 Factor 4 – Difficulties in prosecution and co-ordination under MBIS

Factor 4 is composed of five items which are pertaining to prosecution and co-ordination upon the execution of MBIS. Three out of the five items under this factor group are concerned with the unco-operative actions and co-ordination problems with the individual flat owners. The prevailing situation of multi-ownership of the existing old buildings in Hong Kong may impede the repair and maintenance works for the common parts of multi-storey buildings such as entrance lobbies, access corridors and staircases (Lai and Chan, 2004; Yau, Ho and Chau, 2008). The fragmented ownership was also seen as another barrier to implementing MBIS. The inspection arrangements and maintenance works for the buildings especially without owners' corporations would be difficult to be conducted, and thus it is common that the renovation or maintenance works of these buildings have been always delayed. Yip and Forrest (2002) suggested that the formation of owners' corporation is indispensable and effective in resolving common problems of building ageing and deterioration. Owners' corporations (OCs) are an organisational form designed to enhance and facilitate collective resident involvement in the management and maintenance of mainly high-rise buildings. Once established, the OCs may help arrange the building inspection and repair and maintenance works by appointing RIs and RCs, respectively.

Chan (2008) stressed that a myriad of property owners ignore their legal responsibility for building repair and maintenance, and their building care culture is very weak. They often exhibit a passive "wait-and-see" attitude until serious problems appear. Furthermore, Fung (2008) believed the initiatives of owners and owners' ignorance are two of the main reasons associated with building neglect. Thus, it is advocated to increase the level of penalty to those property owners who do not undertake regular building inspection and stipulated repair works in terms of fine (currently HK\$50,000) and imprisonment (currently 1 year).

As MBIS is a relatively new scheme for the building owners, it has not yet well made known within the Hong Kong community. Thus, the more promotions on MBIS through different media channels such as advertisements on television, internet sources, public venues and posters mounted up at private residential buildings, would be effective in conveying the perceived benefits and implementation procedures of MBIS towards the private property owners for reminding their legal responsibility for building inspection and maintenance of their buildings.

7. Conclusions

The identification and investigation of the major difficulties in implementing MBIS in Hong Kong was the primary objective of this paper. A total of sixteen individual statements describing several difficulties of MBIS were compiled and ranked by a group of target industrial practitioners with extensive direct hands-on experience in either new works or building management or repair/maintenance works via an empirical questionnaire survey. It also aimed to compare the ranking patterns and to test for any significant agreements or disagreements between the various groups of survey respondents with reference to their current residence (public vs private).

The industrial practitioners recognized that there are several difficulties which may hinder the implementation of MBIS. The co-ordination of the individual flat owners, mutual agreements amongst them, together with their initiative and co-operation, were the major considerations for carrying out the building inspection and maintenance works. They were both the top 3 difficulties ranked by both the “Private group” and the “Public group”. Besides, the financial capability of the property owners, guidelines, financial and technical assistance, promotion, supervision and prosecution by the government were also the decisive factors in determining whether MBIS is successful or not. Furthermore, the number and competence of the RIs and RCs are also vital for the implementation of MBIS with success. After determining the key difficulties, some improvement strategies or measures were then recommended to facilitate the smooth implementation of MBIS in near future.

The full execution of MBIS commenced on 30 June 2012. Although its effectiveness is not still clearly known at this stage, it is expected to change the current deteriorating situation of dilapidated buildings in Hong Kong. Its significant difficulties were taken into account by various key stakeholders including property owners, government officers and industrial practitioners, and it is hoped that they can be resolved or even eliminated. The success of MBIS can cope with the long-standing problems of building dilapidation and neglect in Hong Kong, and may prevent any kinds of accidents relating to building deterioration from happening again.

It is hoped that the research study has stimulated a wider debate on the underlying difficulties encountered with MBIS in both a local and international context for reference by the community at large and the construction professionals in particular. It is recommended that a similar scheme to MBIS currently applied in Hong Kong may be extended to other developed or developing regions or countries (e.g. Singapore, Taiwan, China, Japan, United Kingdom, United States, Australia, etc) for implementation to achieve excellence in building safety as a whole.

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