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Sustainable Development in Urban Renewal in Hong Kong: A Physical Assessment

Daniel Chi-wing HO
Department of Real Estate and Construction, University of Hong Kong, Hong Kong, PRC
danielho@hku.hk
Yung YAU
Department of Public and Social Administration, City University of Hong Kong, Hong Kong, PRC
y.yau@cityu.edu.hk
Sun-wah POON
Department of Real Estate and Construction, University of Hong Kong, Hong Kong, PRC
swpoon@hku.hk

ABSTRACT

About four percent of the buildings, approximately 2,200 buildings, in Hong Kong had already exceeded the end of their design life of 50 years. Coupled with this engineering issue, the lack of proper building maintenance and management has led to serious problems of building dilapidation in developed urban areas. This situation poses severe safety hazards and hygienic problems to their neighbourhoods and occupants, especially in such a high-rise, high-density built environment like Hong Kong. Although the purpose of urban renewal or regeneration is to revitalize the urban environment, there appears to be a general inclination towards redevelopment. However, the speed of dilapidation would probably exceed the economy's capability of absorbing such a large volume of redevelopments. Besides, redevelopment would have severe impacts on the social fabric, and would create a large volume of demolition and construction waste that well surpasses the current landfill capacity in Hong Kong. A sustainable strategy for urban renewal is therefore urgently needed. This project aims to establish an existing profile of the conditions of buildings or areas in Hong Kong and their suitability for various urban renewal strategies via the establishment of a structured building assessment scheme called the Dilapidation Index (DI). 393 private residential buildings in four districts in Hong Kong were assessed using the DI, and appropriate methods to regenerate these buildings were suggested based on the assessment results accordingly.

KEYWORDS

Urban renewal, building conditions, redevelopment, building rehabilitation, Hong Kong

INTROUDCTION

Buildings play an important role in determining a city's sustainability. However, much of the academic and policy attention has been casted on the design and construction of new developments; the part played by existing building stock has been largely ignored. In fact, new developments comprise only a small portion of the overall building stock throughout the world and, therefore, whether the existing buildings are properly managed matters a great deal in the agenda of sustainable built environment. For instance, healthiness of the buildings has a strong bearing on the occupants' wellbeing (1,2). Moreover, buildings improperly managed and maintained eventually run into dilapidation, resulting in excessive depreciation which undermines the economic sustainability of the built environment (3). Even worse, the problems of building dilapidation or dereliction bring about premature redevelopments. Against this background, an increasing number of scholarly works advocated putting more academic foci on the long-term management of the existing building stock (4-6). Like many other developed cities, Hong Kong has suffered from the plight of urban decay. According to the Home Affairs Department's Database of Private Buildings in Hong Kong, about four percent (or approximately 2,200 buildings) of the 55,000 private buildings in the city had already exceeded the end of their design life of 50 years (7). Coupled with this engineering issue, the lack of proper building maintenance and management has led to serious problems of building dilapidation in developed urban areas. As reported extensively in the literature, this situation poses severe safety hazards (e.g. fires and falling objects) and hygienic problems to their occupants and passersby because of Hong Kong's high-rise high-density built environment (8,9). Despite the total number of reports about building danger received by the Buildings Department has been on a declining trend since 2005, the figure tripled in the 13-year time between 1995 and 2008 (Table 1).

Table 1: Numbers of reports received by the Buildings Department about dangers from buildings (10-12)

Year	Dangerous Advertising Signs	Dangerous Buildings	Dangerous Hillsides	Unauthorized Building Works	Total Number of Reports
1995	230	1,974	38	8,203	10,445
1996	165	2,567	91	9,913	12,736
1997	350	3,658	130	12,427	16,915
1998	250	3,851	53	12,577	16,731
1999	614	4,730	130	16,999	22,473
2000	260	4,280	71	13,911	18,522
2001	178	6,671	41	12,764	19,654
2002	135	5,956	52	21,844	27,987
2003	181	8,665	48	24,870	33,764
2004	303	10,407	146	21,123	32,069
2005	331	13,999	208	25,683	40,221
2006	564	6,758	183	24,861	32,366
2007	322	4,566	128	24,633	29,649
2008	563	6,138	313	24,942	31,956

To solve the building problem in Hong Kong, urban renewal or regeneration aiming at revitalization of the urban environment has been adopted. While there are different modes of urban renewal, namely preservation, redevelopment and rehabilitation, the public sector and private real estate developers incline towards redevelopment apparently. Provided that land resource is extremely limited in the city and housing needs are ever surging, redevelopment can help release under-utilized urban land without compromising the city's natural environment. Besides, substandard buildings, incompatible land uses and environmental nuisances can be eradicated through the exercise (13). Nevertheless, redevelopment unavoidably involves lengthy processes of property acquisition so the speed of dilapidation would probably exceed the capability of the economy to absorb a large volume of redevelopments. Moreover, redevelopment would have a severe impact on the social fabric (14,15), and would create a large volume of demolition and construction waste that well exceeds the current landfill capacity in the territory (16). In this regard, there is a growing body of literature studying the choice between different modes of urban renewal (16,17). To make Hong Kong a healthy and comfortable place to live in, the government urgently requires a forward-looking strategy for sustainable urban renewal or building stock management. To this end, information regarding the existing conditions of the building stock is necessary for an informed strategy formulation. Accordingly, this article attempts to develop a decision tool based on a structured building assessment scheme which offers public administrators and other stakeholders of urban renewal a profile of building conditions in different districts in Hong Kong.

DECISION TOOL FOR SUSTAINABLE MANAGEMENT OF BUILDING STOCK

As aforementioned, there is a need for the Hong Kong Government to have an overview of the condition profile of the existing building stock in the city. Nonetheless, no periodic mass evaluation of building conditions that are similar to the American Housing Survey in the United States and the English House Condition Survey in the United Kingdom has been practiced in Hong Kong, and the government simply survey buildings in an *ad-hoc* manner. This gap is not constructive to the attentive management of building stock as it is difficult for the government to identify those buildings which are dilapidated or poorly-performing. As a matter of practicality, to take care of all buildings in Hong Kong simultaneously by the government is virtually impossible due to the very tight budget constraints (18). To facilitate a more rational allocation of available resources to tackle the contemporary building problems, it is vital to prioritize buildings or areas according to their levels of or proneness to dilapidation for actions. This necessitates a tool for benchmarking buildings. With this tool, public administrators or urban planners can decide an appropriate method to renew or regenerate these buildings accordingly.

Although numerous building assessment tools exist around the world, nearly all of them oriented themselves as protocols for comprehensive or detailed building assessment. For example, there are around 380 assessment parameters in the Intelligent Building Index Version 3.0 (19). Most of these tools are targeted for new developments, predominantly non-domestic buildings. While the Housing Health and Safety Rating System introduced by the British Government are tailored for existing housing, its hazard-based rating mechanism is too technical or 'scientific' for operation and interpretation (20,21). In spite of the accuracy or preciseness of the assessment results, building assessment schemes tailored for the purpose of sustainable management of building stock or urban renewal should be practicable in terms of resource consumption and level of knowledge or technology required. It is because assessment schemes of this kind serve for first-tier classification of buildings according to their extents of problem. Upon identification of those seriously problematic buildings, more detailed investigation or immediate remedial actions can be taken by the governments or interested parties on them. In light of these gaps a Dilapidation Index (DI) is developed in this study for urban renewal purpose in Hong Kong.

Construction of the Dilapidation Index

The principles and frameworks of the DI model those of the Building Health and Hygiene Index (BHHI) and Building Safety and Conditions Index (BSCI) developed by the Faculty of Architecture, The University of Hong Kong, with necessary consolidation and simplification (22,23). The DI serves to indicate a building's level of and proneness to dilapidation. Like the BHHI and BSCI, the DI assessment framework is kept as simple as possible to minimize the time and resources required for building assessment. Only those factors or parameters that are conducive to building dilapidation or dereliction are included. For the construction of the DI, a total of 21 building factors were selected by an expert panel with members specialized in building assessment in Hong Kong. It is difficult, if not impossible, to measure or objectively depict some properties of the buildings under assessment. Nonetheless, the assumption here is that it is possible to find sufficient measurable kinds of parameter to evaluate these properties in a way that is both credible and practicable. For the convenience of dilapidation attribution analysis, these selected building factors (Level 3) were hierarchically structured and grouped under nine main *categories* (Level 2), as shown in Figure 1:

1. *Health & Hygiene*: evaluates the existing hygienic conditions and fitness in a building;
2. *Fire Safety*: refers to the conditions of the fire safety provisions (e.g. escape routes, fire compartments and fire service installations) and the existence of fire safety hazards in a building;
3. *Structure & Fabrics*: refers to the physical safety of the building structure and appendages;
4. *Incompatible Uses*: concerns whether the usage of the properties in a building or immediate external environment create health and safety hazards to its occupants;
5. *Responsibility Delineation*: examines whether the rights and responsibilities of the homeowners regarding the management of the common parts of a building have been clearly delineated;

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6. *Evaluation & Documentation*: refer to the carrying-out of occupants' evaluation of the building performance and the keeping of documents that are useful for the management and maintenance of a building (e.g. record drawings);
7. *Planned Maintenance & Operations*: concern operational issues such as daily management tasks (e.g. cleansing and refuse disposal) and maintenance standards for a building;
8. *Emergency Preparedness*: indicates the ability of the building occupants or management to deal with emergency situations such as fire outbreaks or epidemics; and
9. *Financial Arrangement*: refers to the financial ability of the homeowners or building management to pay for planned works (e.g. route maintenance and repair) and unplanned circumstances (e.g. damages to third-party victims of building-related accidents).

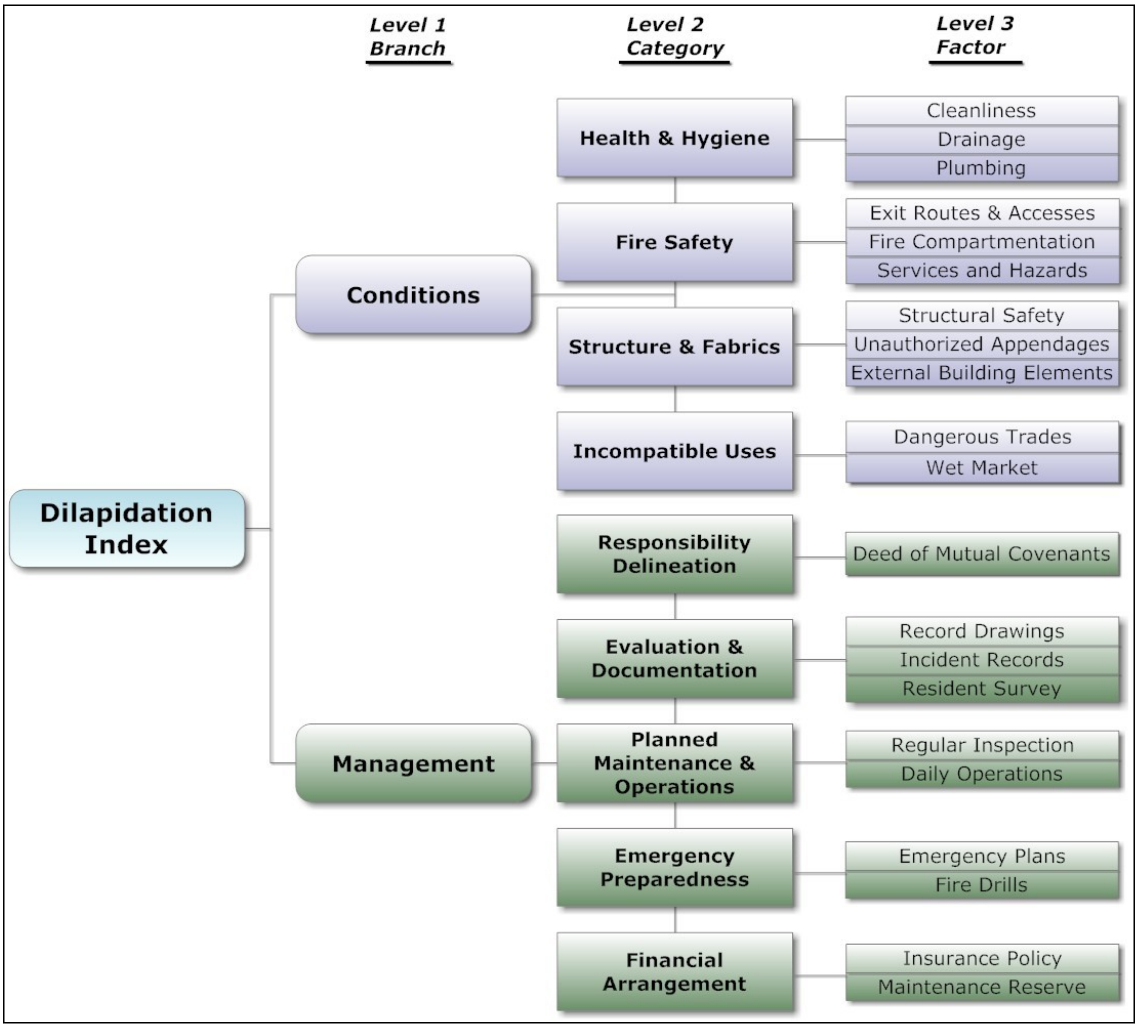

Figure 1: Hierarchy of building factors for the DI

These nine categories are further classified under two umbrellas (Level 1). Building factors in categories such as *Health & Hygiene*, *Fire Safety*, *Structure & Fabrics* and *Incompatible Uses* are called *Conditions* factors because they measure the existing conditions of the buildings under assessment in different aspects. Unlike the design or configuration of a building which is unchangeable, or changeable only at a relatively high cost once a building has been built and in use, building conditions change over time and are subject to the degree of building care initiated by the homeowners. Therefore, the *Conditions* factors collectively indicate the degree of dilapidation of a building as at the day of assessment.

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On the other hand, *Responsibility Delineation*, *Evaluation & Documentation*, *Planned Operations & Maintenance*, *Emergency Preparedness* and *Financial Management belong to* the *Management* umbrella because they may not directly indicate the existing conditions of a building but they do have significant impacts on the building's future conditions. To put it another way, conditions of a building can be improved over time if the homeowners know their rights and responsibilities, the building structure and services are regularly inspected, and there is enough financial support to finance repair or remedial works. Conversely, buildings performing poorly in the *Management* factors can become problematic buildings easily in the future. In other words, the *Management* branch gives an indication of the proneness of an assessed building to dilapidation or dereliction in the future.

With an eye to the practicality of the assessment scheme, all building assessments are confined to the common (or communal) parts of the buildings and external environment. Besides, building factors that are not directly related to health and safety (e.g. energy efficiency and building automation) are excluded in the current assessment scheme because their impacts on the occupants' wellbeing are still weighted low in the Hong Kong's society. From the principles and scopes of assessment laid down above, the DI can be taken as a tool or protocol for benchmarking private apartment buildings in respect of their existing level of dilapidation and proneness to dilapidation in the future. To compute the overall dilapidation, DI_k for building *k*, one simply needs to aggregate the ratings ($F_{H,ik}$) and weightings ($w_{H,i}$) of all *n* building factors:

$$DI_k = \sum_{i=1}^{n} w_{H,i} F_{H,ik} \quad (1)$$

For simplicity, the building factors are taken as equally weighed and DI_k, therefore, becomes the arithmetic mean of the ratings of all *n* building factors. As the DI operates like a penalty point system, each building factor receives a rating ranging from 0 (for the best scenario) to 100 (for the worst scenario). After rating aggregation, each building's DI also ranges from 0 (for the best scenario) to 100 (for the worst scenario). To make the factor evaluation easier and more consistent, building factors may be further broken down into some measurable or easily assessable parameters (Level 4) and predetermined scoring tables will be used by the assessors to assign parameter or factor ratings.

Procedures in Building Assessment

The building factors are assessed through four main processes under the assessment framework. Firstly, desk study offers valuable background information of the buildings under investigation to the assessors. From government departments' websites, information (e.g. age and development scale) of the target buildings can be obtained. What comes next is the on-site visual inspection on building and surrounding conditions. Based on the assumption that conditions of flats, particularly physical fitness, can more or less be reflected by conditions of the communal areas (e.g. podiums, lobbies, staircases and corridors), all parameters to be assessed on site are confined to the communal areas and the immediate external environment of the buildings. In parallel with the on-site inspections, the assessors interview building management staff and/or residents using a preset questionnaire to acquire information of the management practices of the buildings (e.g. frequencies of refuse disposal and fire drill). In cases of doubt, documentary records will be inspected for verification purpose. Finally, the data obtained from the above processes are consolidated for computing the DI of the assessed buildings.

Descriptions of Buildings Assessed

Following the procedures detailed above, 393 multi-storey residential buildings in four districts in Hong Kong were assessed in 2008. The four study districts, namely Sham Shui Po, Yau Tsim Mong, Central and Western and Wanchai, are selected because they cover the target areas set out by the Urban Renewal Authority (URA) for action prioritization (24). 111 (28 percent) buildings came from Sham Shui Po, 114

(29 percent) from Yau Tsim Mong, 128 (33 percent) from Central and Western, and 40 (10 percent) from Wanchai. The characteristics of these assessed buildings are summarized by district in Tables 2 and 3. The average age of the assessed buildings was 32.6 years. 150 buildings (38 percent) had no form of building management, i.e. with no owners' corporation (OC) and property management company (PMC) to manage the building.

Table 2: Physical characteristics of the assessed buildings in the four districts

Characteristic	Statistic	Sham Shui Po	Yau Tsim Mong	Central & Western	Wanchai	Overall
Building age (years)	Maximum	59.3	67.3	58.3	56.2	67.3
	Mean	33.6	33.1	33.2	26.8	32.6
	Minimum	4.8	3.8	4.4	10.8	3.8
	σ	16.4	13.5	12.6	11.1	14.0
Number of storeys (counts)	Maximum	37.0	24.0	34.0	26.0	37.0
	Mean	8.6	10.9	11.0	13.0	10.5
	Minimum	3.0	3.0	2.0	2.0	2.0
	σ	5.9	6.0	8.6	7.8	7.2
Number of units (counts)	Maximum	370.0	410.0	267.0	108.0	410.0
	Mean	28.9	44.7	41.0	34.4	38.0
	Minimum	4.0	3.0	2.0	2.0	2.0
	σ	40.5	66.1	53.4	29.5	52.6

Table 3: Modes of management of the assessed buildings in the four districts

Management Mode	Sham Shui Po	Yau Tsim Mong	Central & Western	Wanchai	Overall
Both IO and PMC	32	38	37	11	107
IO but no PMC	19	30	30	13	79
PMC but no IO	3	9	5	7	17
No IO and PMC	57	37	56	9	150
Total	111	114	128	40	393

Results of the Physical Building Assessment

The preliminary results of the physical building assessment of the whole sample are presented in Figure 2 and Table 4. The DI score ranges from 9.81 to 84.88, with a mean of 54.77 and a median of 58.33, and its distribution is left-skewed. Generally speaking, assessed buildings in Sham Shui Po were found more problematic than those in other districts. The average DI score for buildings in Sham Shui Po is 58.80. On the other hand, buildings in Wanchai performed quite well, with an average score of 49.96. It is largely because of the younger ages of the assessed buildings in that district. As far as the variability in DI is concerned, Central and Western has the highest standard deviation (16.21). As shown in Table 4, the DI scores of the assessed buildings could differ at most by 75. Faced with this large variation in building dilapidation, the public and homeowners of the dilapidated buildings would like to know the underlying reasons. It is for their benefit to know whether they can improve the situation and the best way to make such an improvement. To start with, the dilapidation attribution between the two branches (i.e., *Conditions* and *Management*) should be examined. As one can see in Table 5, the *Management* sub-score has a larger variation, in terms of standard deviation, than the *Conditions* sub-score. Yet, this statistic may not be able explain the two branches' attributions to the overall DI score. In this regard, a variance decomposition analysis has to be conducted to reveal the relative impact of *Conditions* and *Management* on the dispersion of the DI score.

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Table 4: DI scores of the assessed buildings in the four districts

Statistic	Sham Shui Po	Yau Tsim Mong	Central & Western	Wanchai	Overall
Maximum	82.26	79.24	84.88	74.47	84.88
Mean	58.80	56.18	52.47	49.96	54.77
Median	65.85	56.80	58.02	46.24	58.33
Minimum	18.57	28.01	9.81	15.77	9.81
σ	16.16	14.06	16.21	15.35	15.87
Skewness	-0.78	-0.19	-0.64	-0.20	-0.51
Kurtosis	-0.59	-1.11	-0.48	-0.78	0.66

Table 5: The breakdown of the DI scores of the assessed buildings

Statistic	*Conditions* Sub-score	*Management* Sub-score	Overall DI Score
Maximum	76.95	100.00	84.88
Mean	36.35	75.00	54.77
Median	36.31	86.67	58.33
Minimum	5.91	13.73	9.81
σ	14.20	21.82	15.87
Skewness	0.05	0.71	-0.51
Kurtosis	-0.41	-0.81	0.66

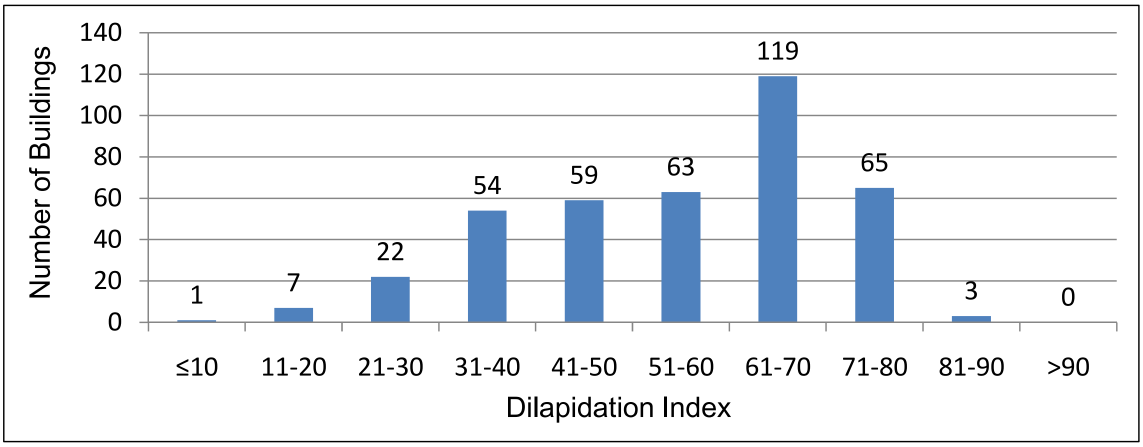

Figure 2: Distribution of the DI score of all assessed buildings

By definition, the DI is the weighted arithmetic mean of the ratings of all building factors contributing to dilapidation of a residential building. Since the building factors come under Conditions and Management branches in the DI hierarchy in Figure 1, the DI can be expressed as a sum of the respective Conditions Index (CI) and the Management Index (MI). In other words:

$$DI_k = w_C CI_k + w_M MI_k \tag{2}$$

where w_C and w_M are the weights of *Conditions* and *Management* branches, respectively. The DI and MI are also computed in a similar fashion to Equation (1). It follows that the total variation in the DI is attributable to: a) the variation in CI, b) the variation in MI, and c) their co-movements. These relationships can therefore be expressed as:

$$V(DI_k) = w_C^2 V(CI_k) + w_M^2 V(MI_k) + 2 w_C w_M Cov(CI_k, MI_k) \quad (3)$$

where *V*(.) and *Cov*(.) denote variance and covariance, respectively. Let *T* be the total variance such that *T* = *V*(*DI*$_k$). The relative importance of each component is given by:

The percentage of variation purely due to *Conditions* factors = $w_C^2 V(CI_k)/T$; (4)

The percentage of variation purely due to *Management* factors = $w_M^2 V(MI_k)/T$; and (5)

The percentage of variation due to their co-movements = $2 w_C w_M Cov(DI_k, MI_k)/T$. (6)

The results of the variance decomposition analysis are summarized in the Venn diagram in Figure 3. It can be seen that 42.13 percent of the variations in the DI were purely attributed to *Management* factors, while pure *Conditions* factors contributed only 22.30 percent to the total variation. This suggests that *Management* factors dominated *Conditions* factors in differentiating the well-performing buildings from the dilapidated ones. In other words, larger variations in dilapidation were ascribed to the differences in building management rather than building conditions.

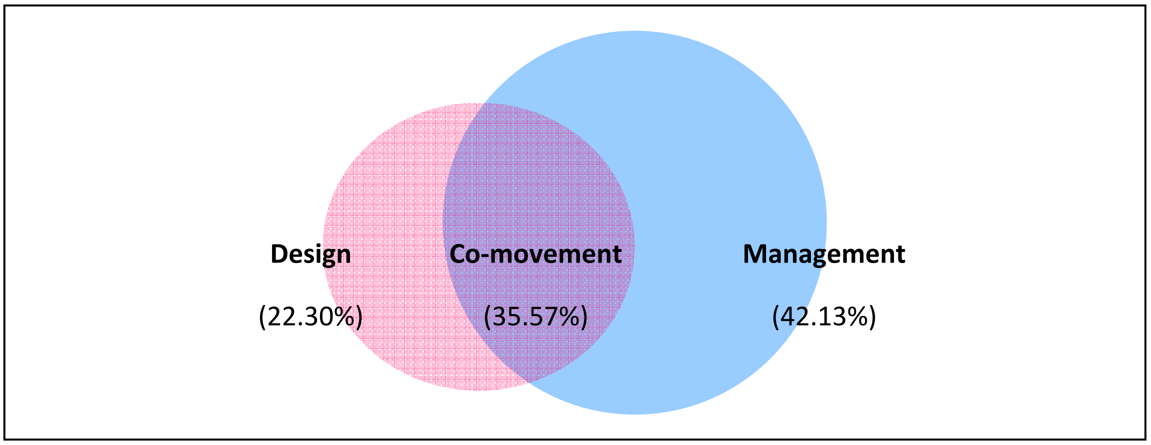

Figure 3: Contributions of *Conditions* and *Management* factors to variations in the DI

DISCUSSIONS

The results of the variance decomposition analysis above suggest that a building's healthiness, in terms of immunity from dilapidation or dereliction, depends more on the management-side issues. Therefore, to arrest the problems of building dilapidation in Hong Kong, the government and homeowners should not simply focus on the existing conditions of the buildings. Building management instruments and practices which immunize the buildings from dilapidation in the medium or long run are equally important. In other words, a balanced view towards building conditions and building management is important to the sustainable management of the building stock in the city.

As aforementioned, the DI score can tell how a building performs. This information can, in fact, facilitate the government or other organizations to allocate resources efficiently to the most needy buildings or areas. In this study, the DI is used for benchmarking individual buildings. In fact, the application of DI can be extended to an area or even district level. In principle, the aggregation of the DIs of individual buildings within a local area can give the area's DI. This information will be very useful for the Hong Kong Government or other public organization in prioritizing their area-based actions such as comprehensive redevelopment or area revitalization. Furthermore, a regularly conducted DI survey in Hong Kong can serve the same purposes as the English House Condition Survey which offers valuable information for the UK Government to monitor changes in conditions of the housing stock and evaluate the impacts of the government policies that aim to improve the built environment (25).

From the factor hierarchy shown in Figure 1, each building can have the DI score sub-scores in addition to the overall DI score. Let us consider the sub-scores for the branches *Conditions* and *Management*. The former reflects the existing conditions of a building while the latter measures the potential for the building to achieve good performance. Based on the building assessment results, the sub-scores of the 393 assessed buildings are mapped in a 2-dimensional matrix, as illustrated in Figure 3. This sub-score matrix can offer decision-makers insights into what actions should be taken to achieve a sustainable built environment.

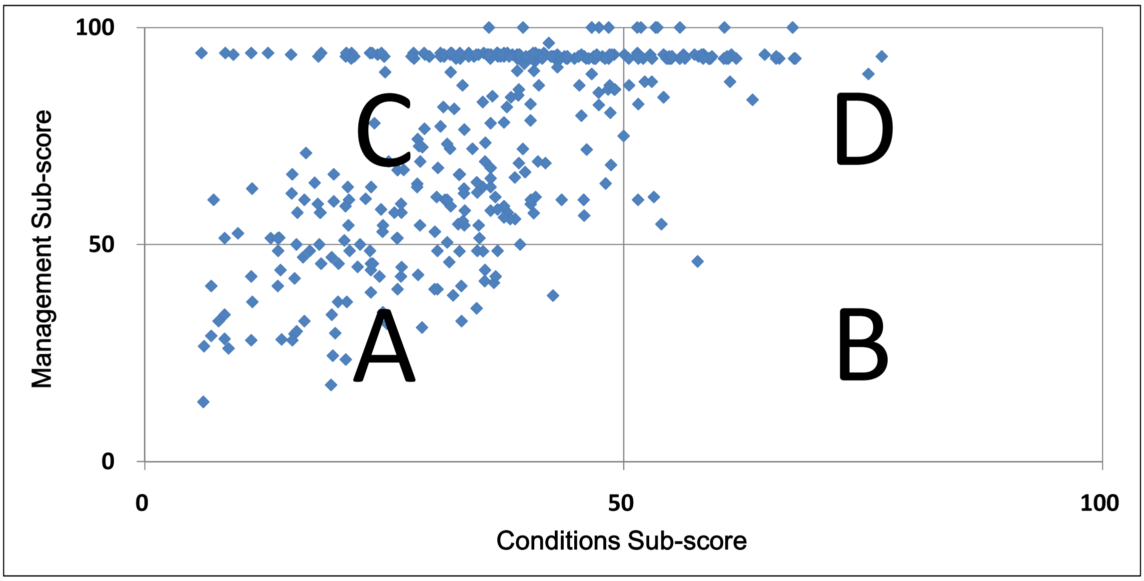

Figure 3: Scatter plot of the *Conditions* and *Management* sub-scores

With a relatively low *Conditions* and *Management* sub-scores, buildings mapped in Quadrant A (i.e. the bottom left-hand quadrant) do not suffer from a high degree of dilapidation nor have a high potential of running down in the near future. In this regard, no special action except for continuing the current good practice of building management is required for the buildings. In other words, public resources for these well-conditioned and well-managed buildings are kept to minimal. For those laying in Quadrant B (i.e. the bottom right-hand quadrant), their current state of condition is the matter of concern. With high potential to get rid of the dereliction, the homeowners of these buildings should be encouraged (e.g. by means of voluntary building classification) or forced (e.g. by means of stricter enforcement) to undertake improvement works to their buildings in return for higher rental or value of their properties or lower chance of prosecution.

For buildings with good existing conditions but lacking potential for keeping its performance for the future (i.e. buildings in Quadrant C or the top left-hand quadrant), the government should put more resources to educate the homeowners on the importance of building care. Besides, financial subsidies (e.g. low-interest loans or non-repayable grants) and technical support should be given by the government to the homeowners for the maintenance and management of their buildings. At the other extreme, buildings in Quadrant D (i.e. the top right-hand quadrant) are badly dilapidated and lacking potentials to achieve good performance in the near future. For these buildings, it may not be practical to carry out any improvement works to then because the improved conditions cannot sustain for long periods of time. In this case, the government may need to take an integrated approach to help the homeowners of these buildings. On one hand, the government or other public organizations have to take the lead to carry out the necessary works to the buildings to eliminate building dangers and improve the living environment. On the other hand, the government should make use of the statutory power conferred by the *Building Management Ordinance* (Chapter 344 of the *Laws of Hong Kong*) to mandatorily require the formation of OC and/or appointment of PMC for these buildings. Alternatively, redevelopment may be also considered as the last resort for 'upgrading' buildings of this end. As one can see, the sub-score matrix in Figure 3 can achieve more informed decision-making in respect of the sustainable management of building stock, not just in Hong Kong but also globally.

Moreover, to arrive at a single index, the building factors included in the DI framework should be weighted according to their significance or contribution to building dilapidation. Yet, an assumption that the building factors in the framework have equal significance towards building dilapidation was made in the study. This approach of aggregation may be problematic because it ignores the variability of the relative importance of building factors. To arrive at more realistic assessment results, it is essential to know the factor weightings. One should bear in mind that with reference to different assessment objectives, the weightings of individual building factors or attributes to be assessed should be different (26,27). For example, in this study, we need to know the relative importance of building factors to the existing degree of and proneness to building dilapidation. In the absence of objective empirical evidence, such as the relative impact of a factor on a building's concrete strength for generating factor weightings, recourse has to be made to the use of subjective opinions from building users or experts through multiple-criteria analysis techniques. For instance, Delphi method or analytic hierarchy process developed by Thomas Saaty (28) can be used to determine the weightings.

CONCLUDING REMARKS

In the 21st century, 'sustainable development' is an item most frequently found in the policy agendas for the development of almost all countries and cities in the world. Given the close relationship between housing quality and human well-being, how to ensure that the community are living in a healthy and comfortable environment is a big challenge to public administrators in many jurisdictions. In fact, to promote the social, economic, and environmental quality of human settlement development is one of the objectives set out in Agenda 21 of the United Nations (29). While urban renewal can help eliminate, or moderate at least, the problems of building dilapidation or urban decay, different approaches could create different impacts on the local community and the society as a whole. Interests in economic, social, physical and other aspects have to be balanced in the due course. In this light, there is a need to have more informed decision making on the issue of urban renewal. In Hong Kong, the high-density high-rise development mode gives the city a unique skyscraper identity. However, this compact environment also creates far-reaching public health and safety hazards if the built environment does not function well. As shown by the official statistics, the number of old buildings in the territory will grow hastily in the near future, the building stock is at risk of decay or dilapidation. Therefore, this challenge has to be properly addressed without further delay for the sustainable management of the building stock in Hong Kong.

The DI assessment framework developed in this study can help stakeholders of building sustainability, including the government, homeowners, developers and general public, to benchmark the degree of and proneness to dilapidation of buildings in Hong Kong. The territory-wide carrying out of the DI survey is beneficial to all parties as the assessment scheme provides a useful tool for them to identify problematic buildings or areas for different actions. For the government or public organizations (e.g. the URA), the DI framework can be used as a policy tool for selecting target buildings or areas for a wide range of actions such as redevelopment, enforcement against building disrepair and education. The importance of this application becomes more noticeable especially during the time of government's financial stringency. For developers engaging in redevelopment projects, the DI can be employed to justify their application for the compulsory sale order from the court under the *Land (Compulsory Sale for Redevelopment) Ordinance* (Chapter 545 of the *Laws of Hong Kong*). The homeowners can also make their maintenance and repair decision based on the DI assessment results. As a result, the DI assessment scheme will serve to foster a culture of building care among homeowners, and to facilitate urban renewal in the city.

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