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The Opportunities and Challenges of Implementing BEAM Plus in Hong Kong from the Perspectives of Government and Developers

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Abstract: Due to the enhancing environmental concerns worldwide with the need of increasing demand for sustainability of building design, maintenance and operation, key stakeholders including the government and developers in many countries strike for the benefits in implementing the green design and building concepts in constructing, infrastructure as well as the buildings. Different countries have their standards or certifications for green buildings while the adoption rate of BEAM-Plus in HK is relatively less compared with other developed countries such as Europe, USA and Japan. Therefore, in the present research, BEAM-Plus, the beginning assessment method of green standard implemented in HK, will be mainly discussed. Current situation of BEAM-Plus implementation in HK will be reviewed and then adopt a systematic approach via literature review and research paper, questionnaire with Analytic Hierarchy Process (AHP) method to depict the opportunities and challenges from the perspective of government and developers regarding implementing BEAM-Plus in HK and thus investigate the implementation gaps. It is found that for both the macro level of opportunity and challenge, the most important criterion is political, in which the weighting value are 0.3114 and 0.2321 respectively. It is obvious that government plays a critical and significant role in affecting the development of BEAM plus. Technological difficulty is also an important factor that challenging and hindering the implementation of BEAM plus, the weighting value is 0.2194 under challenge hierarchy. More experts and professionals should be imported to Hong Kong to enhance the technique is building green buildings. At the end of this paper, solutions and actions will also be suggested and concluded in alleviating the challenges. Finally, solutions and actions are suggested and concluded in alleviating the challenges. Findings from this research can guide developers to consider adopting green elements, government and Green Building Council in HK to review green buildings' policy.

Key words: BEAM Plus, opportunities, challenges, stakeholders, green

1. INTRODUCTION

There is an enhancing environmental concerns worldwide in construction and building together with the needs of keeping pace with the growing global demand for sustainable building design, construction, operations and maintenance and there are different countries have their standards or certifications for green buildings in different cities and countries. For example, Leadership in Energy and Environmental Design (LEED) in US, Green Mark Scheme (GMS) in Singapore, (Comprehensive Assessment System for Built Environment Efficiency (CASBEE) in Japan and BEAM Plus in Hong Kong. However, the proportion of green building and adoption rate of BEAM Plus in Hong Kong is relatively low compared to other developed countries such as Singapore. In this paper, BEAM Plus, which is the first building environmental assessment method implemented in Hong Kong for the promotion of green building practices, will be mainly discussed.

2. RESEARCH OBJECTIVES

(1)To identify the key opportunities or motivations for the implementation of BEAM Plus from the perspectives of government and developers.
(2) To identify the key challenges or barriers of the implementation of BEAM Plus from the perspectives of government and developers.
(3)To investigate the gap between the perspectives of government and developers; and to make suggestions to facilitate the implementation of BEAM Plus.

3. LITERATURE REVIEW

3.1 Opportunities of implementing the Green Building Concept

There are empirical studies reporting various specific influences driving the current push towards Green Building development in different countries.

3.1.1 *Opportunities in Hong Kong and Other Countries*

Jayantha and Man (2013) [17] found that a sales price premium ranging from 3.4% to 6.4% is generated for housing units in building certified either for housing units in buildings certified with either HK-BEAM issued by the BEAM Society or the Green Building Award issued by the HKGBC. Qian (2016) [24] stated that Singapore not only promotes higher-tier green building rating which only projects certified with Green Mark Gold Plus or above can acquire the GFA concession, but also provides special financial incentives for professional such as engineers and architects to compensate for their extra time and effort that they have spent on Green Building. Fan, K., Chan, E. and Chau, C. (2018) [12] stated that Singapore government provides cash incentive to the developers and also project consultants for the new development which is at least 2 thousand sqm and achieves green mark gold rating or higher. The Singapore government has incorporated the green buildings into the city's master plan. According to the surveys conducted to CASBEE Professionals, Wong and Able (2014) [33] discovered that the top 3 incentives were priority reviews of green projects, following by the bank's preferential interest rates for a green development and building owners'financial incentives. Olubunmi, Xia and Skitmore, (2016) [23] stated a point that owners of the buildings applied green building concepts is due to the altruistic incentives which they believe the effects of climate change on human beings is real and they can put their effort to reduce the effect. The attracting financial and non-financial incentives motivate more and more developers to implement green building concepts in Hong Kong and other countries.

3. 2 Challenges of implementing the Green Building Concept

Zhang et al. (2012) [38] concluded there are 3 main challenges in applying green roof system for buildings in Hong Kong. They are "lacking of promotion to the public and private communities and promotion from the government", "lacking of the incentives from government on existing buildings" and "rise in maintenance cost". These challenges appear in the whole process of building cycle, from the very beginning to the completion of the construction. Townshend (2007) [31] also found lack of promotion from government is one of the hindering factors to the green roof building in Hong Kong. Other than that, Townshend (2007) [31] also outlined other barriers, which are the aging of existing building, poor utility arrangement, weak structural loading and lack of awareness in public and private sectors. Rather than the maintenance cost concluded by Zhang et al. (2012) [39] , design, material, construction and transportation cost would be the critical cost-related factors. Besides, lack of completed integration among projects, experience, knowledge, standards, life cycle costing knowledge, time and funding are also the main barriers to the green buildings implementation.

3.3 Hong Kong and Overseas Practices in Green Building

3.3.1 *Green Policies of Buildings in the World*

Liu and Yu (2013) [21] reviewed that legal aspects from voluntary to mandatory tools were found as playing an essential role in promoting green building. Indeed, voluntary tools in regulations are found to be a great success in advancing the green building standard in developed countries in Europe, such

as UK and Netherlands. However, mandatory policies would be more effective on developing countries, such as Taiwan. They compared the policies between two Asian leaders on economic development.

3.3.2 Green Policy of Buildings in Hong Kong

In Hong Kong, there is no mandatory tool in green building requirement. According to Wong (2015) [36], Hong Kong Government adopts a target-based green performance framework. After reviewed the performance targets, new government buildings with a construction floor area for more than 5,000 sq. m. is targeted to attain "Gold" rating or above on BEAM Plus certification and a target on saving in total electricity consumption is set. It also proposed sustainable building design guidelines for the developers to follow. According to Wong (2015) [36], Building Energy Efficiency Ordinance was implemented in 2012. It requires the key building service installations of newly constructed buildings and existing buildings with major retrofitting works to comply. It also required the owners of commercial buildings to have energy audits once every 10 years to make sure energy efficiency. In 2009, the government launched the one off three-year Building Energy Efficiency Funding Schemes (BEEFS) to provide monetary allowance to building owners to conduct energy audits and implement energy efficiency improvement works.

4. RESEARCH METHODOLOGY

The research methodology of this paper consists of comprehensive literature review, existing research paper and report, questionnaires and survey and face-to-face structured interview.

4.1 Search Strategy

This research paper is following a systematic and structured processing method. Firstly, a deep search of publications about green building incentives or practise in HK and other countries are conducted from 28 Jan 2019 in large databases in Google and library of the Polyu. The study will be focused on keywords like "Gree n Building Incentives", "BEA M Plus", "Opportunities and Challenges of G reen Building", "Green Building Policies" resulted in more than 100 papers and publications. Secondly, titles and abstracts of those publications are addressed, which allows us to have an initial judgment of whether the publications are suitable and relevant or not. Thirdly, we have review the content of those publications.

4.2 Questionnaire – AHP Method

The structure and framework of the questionnaire survey mainly focus on how those respondents' thinking about the opportunities and challenges in the implementation of BEAM Plus in HK. At least 40 participants will be given the questionnaire. Target groups and participants consist of different stakeholder involving in property and construction related sectors such as designer, contractor, engineer and so on. A more comprehensive and precise result could be achieved by having a variety of opinions from different stakeholders. The questionnaire framework will be constructed based on the assessment model called "AHP" developed by Saaty (1980) [29] . Under AHP, the opportunities and challenges are classified into two separated hierarchies. Each hierarchy is divided into 3 levels. At the top level, it will be the optimal goal that we would like to find out through the questionnaire survey and quantitative calculation, that would be explained in details later. At level 2, it will be the macro- criteria and at level 3, it will be the micro- criteria.

1. Opportunity: In the Marco hierarchy, there are four areas including (1) political, (2) financial, (3) non-financial & altruistic and (4) internal. In the micro hierarchy, there are numbers of micro indicators under each marco-area. For example, under political criteria, there are the regulatory requirements; under financial criteria, there is price premium. All of the indicators have been concluded in the literature review of the opportunity part. The overall hierarchy has been shown in Figure 2 below.

2. Challenge: In the Marco hierarchy, there are five areas including political, financial, non-financial, internal and technological. In the micro hierarchy, there are numbers of micro criteria under each Marco-area. For example, under political criteria, there is the lack of government's promotion; under financial,

there are high maintenance costs. All of the indicators have been conclude in the literature review of the challenge part. The overall hierarchy has been shown in Figure 1 below. After constructing the hierarchy, pair-wise comparison matrix will be employed to give ranking and relative importance weight for the macro criteria and micro criteria. Respondents will be asked to assess the macro criteria and micro criteria between each other and they will appraise the relatively important weight for the criteria in macro level against the others in the same level. Same practice will be applied in the micro-level criteria. To make it easier, respondents will be asked to compare only the micro criteria against the other under each macro criteria, but not compare across the criteria under different macro criteria.

Pair-wise comparison matrix = $\begin{bmatrix} C_{11} & C_{12} & C_{13} \\ C_{21} & C_{22} & C_{23} \\ C_{31} & C_{32} & C_{33} \end{bmatrix}$ (1) Where C_{ij} is the relatively importance score

As well as we have numbers of respondents to the questionnaire; it is better to use geometric mean instead of arithmetic mean.

$$C = \sqrt[n]{C_1 \times C_2 \ldots\ldots \times C_n} \qquad (2)$$

Next, after collecting all the data, we will do the normalization for the matrix elements. The values in each column will be summed up and the values in the matrix will be divided by it column summed value to generate the normalized value X_{ij}.

$$X_{ij} = \frac{C_{ij}}{\sum_{i=1}^{n} C_{ij}} \qquad (3) \qquad \text{Normalized value} = \begin{bmatrix} X_{11} & X_{12} & X_{13} \\ X_{21} & X_{22} & X_{23} \\ X_{31} & X_{32} & X_{33} \end{bmatrix} \qquad (4)$$

The values of normalized row will be summed up and divided by total number of criteria at the same column to find out the weighting value W_{ij}, or it can be said as eigen vector. It is a value that gives ranking to the criteria: the higher the value, the more important of the criteria. Normally, after calculating the eigen vector, eigenvalue model will be employed to find out the Consistency Index (CI). This is an issue happened frequently that the respondents do not give a consistent score to the pair-wise matrix. To avoid the consistency problem, only the first row will be shown in each of the pair-wise matrix table in the questionnaire. Respondents are not necessary to give score to the second row or below. Therefore, CI is not in the scope in this paper.

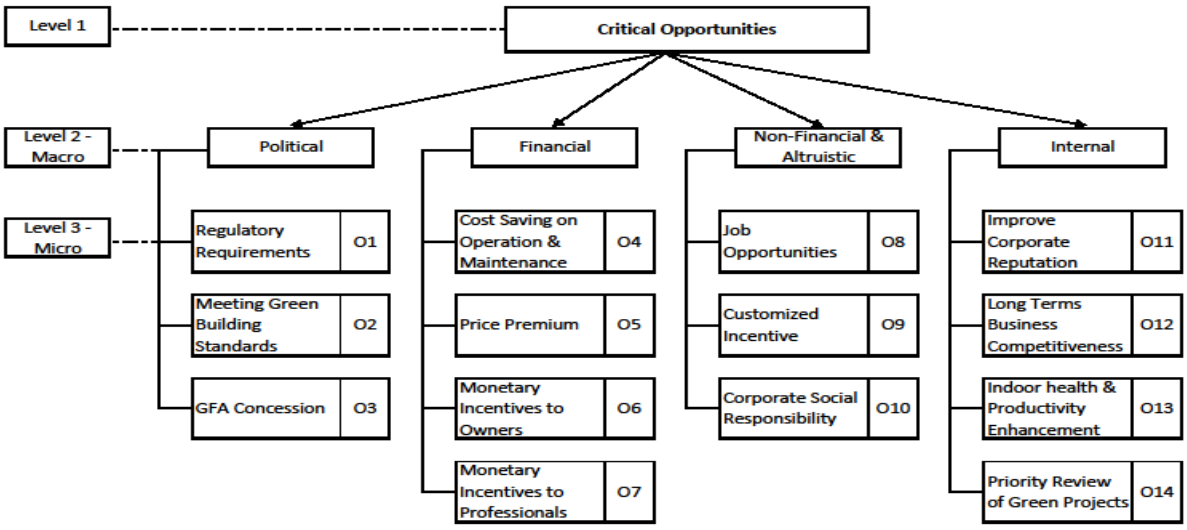

Fig. 1 – Hierarchy of Opportunity

5. Data Collection

Data were collected through the distribution of the questionnaire by different methods such as communication application tools (whatsapp and wechat), email or by hand. We have sent out 40 questionnaires to those who have involved and participated in green project and/or working in the property and construction related industries. Ultimately there are 31 questionnaires received, with a 77.5 percent reply rate. There are altogether 3 parts in each questionnaire. Part 1: the basic background of the

respondent. Part 2: Analytic Hierarchy Process (AHP): 11 comparison matrixes for potential opportunities and challenges in HK. Part 3: the comments or opinions on the existing BEAM Plus certificate and suggestion to advance the development.

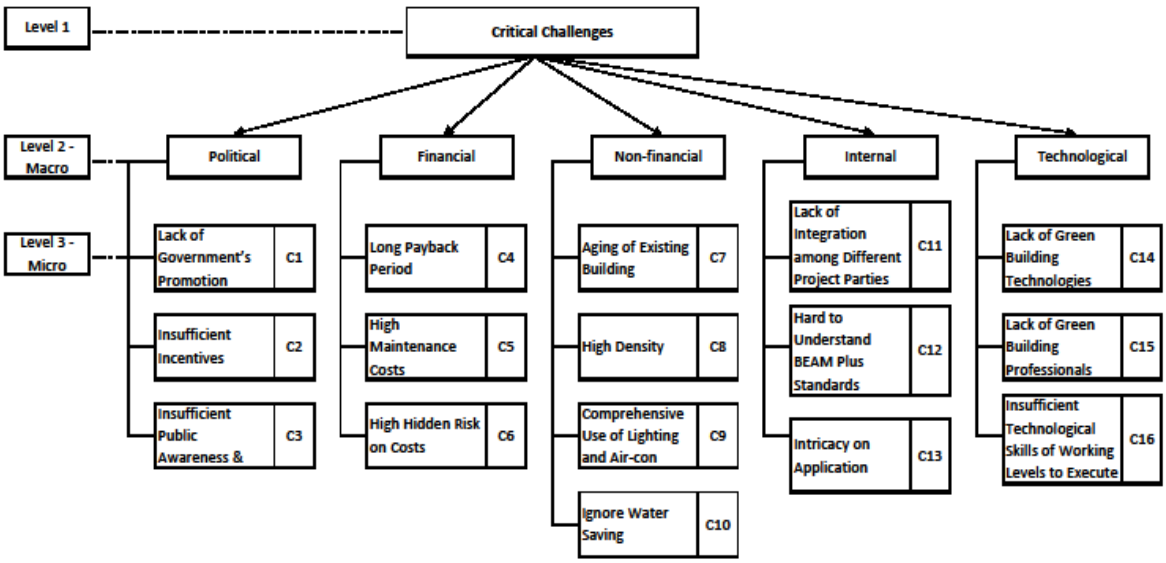

Fig. 2 – Hierarchy of Challenge

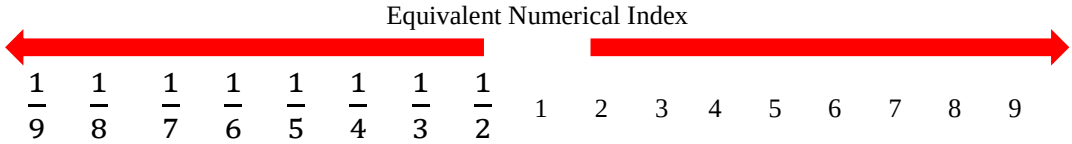

Fig. 3 - Relative Importance Weight

6. Research Findings

The following tables show the quantitative calculation result and the weighting value of every criterion, including both the macro and micro criteria, about the experienced respondents rating the importance of them.

6.1 Opportunity

Table 8 shows the weighting value of macro criteria under opportunity. Results show that Political factor has the highest average weighting value of 0.3114 and the second highest is Non-Financial & Altruistic factor, which has 0.2844. The lowest value is Financial criteria, which has only 0.1543. It implies political factor has the greatest impact on pushing the BEAM Plus implementation. Money and return is not an attractive motivation to the stakeholder. Table 9 shows the weighting value of Political criteria under opportunity. Results reflect "Meeting regulatory requirements" has the highest score of 0.4501, however, "GFA Concession" has the lowest value of 0.2624. The result shows one of the important successful factor is to meet the government regulation, instead of the green standard itself. Table 10 shows the weighting value of Financial criteria under opportunity. It can be seen that "Cost saving on operation and maintenance from efficient use of materials" has the highest value of 0.3567 and the second highest value is "Sales price or rent premium - Respond to customer demand on green building", which has 0.2262. The third and lowest score is similar, and has 0.2088 and 0.2083. They are "Monetary incentives to owners e.g. Profit Tax reduction, subsidy and preferential interest rates offered by bank for green projects" and "Monetary incentives to professionals for inventing and implementing solutions and technologies on green building" respectively. The especially high score of "cost saving" show there would be a great opportunity and motivation in implementing BEAM Plus if cost can be saved from effective and efficient use of materials.

Table 11 shows the weighting value of Non-Financial & Altruistic criteria under opportunity. It is found that "Job opportunities created to the society" has the highest value of 0.3902. The lowest value

is “Corporate Social responsibility, reduction in construction pollution, energy and water saving and put effort to deal with global warming”, which has 0.2878. It seems the job created to the society would be the biggest diver in realizing the BEAM Plus under this criterion. Table 12 shows the weighting value of Internal criteria under opportunity. From the table, it shows the highest score belongs to “Improving corporate reputation and marketability**”,** which has 0.3806. **“**Enhancing indoor health and productivity” has the lowest score of 0.1927. It is surprised that respondents care less about the health bought from BEAM Plus. Instead, they think the reputation and marketability achieved by the company would be the largest opportunity in participating the BEAM Plus.

6.2 Challenge

Table 13 shows the weighting value of macro criteria under challenge. Results show that Political factor has the highest average weighting value of 0.2321 and the ranking is the same as in opportunity analysis. The second highest is Technological factor, which has 0.2194. Financial factor has the lowest value of only 0.1783. It shows government plays an important role in the BEAM Plus implementation. Without the help of government, it is difficult to gain success. Besides the issue of the government, insufficient technological skill is also an indispensable problem and challenges that hinders the BEAM Plus development. Again, money and cost is not a big obstacle. Table 14 shows the weighting value of Political criteria under challenge. It can be seen that “Lack of promotion from government” has the highest score of 0.4773. The lowest value belongs to “Insufficient incentives from government”, which has 0.2085. The promotion from government is a critical element to gain achievement. Lack of it will be a great barrier to the BEAM Plus implementation. Table 15 shows the weighting value of Financial criteria under challenge. Results show that “Incremental construction and investment costs with long payback period” has 0.4066, which is the largest value. The lowest value is “High maintenance cost”, which has 0.2284. It shows that the construction cost and long period of return on investment is the biggest concern among the investors. Once the green building is constructed, the maintenance cost is relatively less important.

Table 16 shows the weighting value of Non-Financial criteria under challenge. Results reflect that “Aging of existing building” has the highest score of 0.2687 and the second highest is “High density of HK”, which has 0.2479. “Comprehensive use of lighting and air conditioning” has the lowest score of 0.2385. The problem of aging buildings is a long issue in HK. Not surprisingly, it is the biggest barriers to the BEAM Plus implementation under this criterion as it is quite difficult to undertake a large renovation project on such old building. Table 17 shows the weighting value of Internal criteria under challenge. It is found that “Intricacy on applying BEAM Plus certificate” has the largest value of 0.3586. And “Lack of integration among different project parties” has the lowest value of 0.3146. It is clear that the complexity of applying the BEAM Plus is a crucial challenge and barrier. Before building a green building, it is necessary to submit dozens of documents and to fulfill a lot of standard requirement set up by government organization, such as Fire Safety Ordinance etc. Table 18 shows the weighting value of Technological criteria under challenge. Results indicate that “Lack of green building technologies” has the largest score of 0.4085. The lowest score belongs to “Lack of green building professionals”, which has 0.2826. HK is a place that is full of professionals in many fields. However, green practice is not really a mainstream in the construction industry HK. More skilled and experienced professionals are needed for the further BEAM Plus development.

All in all, under the opportunity hierarchy, Political factor is the most important among the macro level criteria. If the government could become the starter and driver in BEAM Plus, success will become easier. Under the challenge hierarchy, Political factor is also the most important criteria. In the growth and development of BEAM Plus, government could be the motivator and also be the obstacle. Without its help, implementing BEAM Plus would be a challenging task. The importance rating of the micro criteria of each macro criteria under opportunity and challenge hierarchy has also been discussed above. However, there is still a limitation. No cross comparison of all micro criteria under opportunity and challenge is studied. Only the top ranking of the micro criteria under each macro criteria is concluded, but there is no overall top ranking among all micro criteria under opportunity and challenge.

Table 8 - Weighting value - Marco Factor

Criteria	**Marco-Factor - Normalization**	**Final Result**

	Political	Financial	Non-Financial & Altruistic	Internal	Ave Weight	Ranking
Political	1	2.0188	1.0952	1.2460	0.3114	1
Financial	0.4954	1	0.5425	0.6172	0.1543	4
Non-Financial & Altruistic	0.9131	1.8434	1	1.1377	0.2844	2
Internal	0.8026	1.6202	0.8789	1	0.2499	3

Table 9 - Weighting value - Micro Factor: Political

Criteria (Political)	**Micro-Factor - Normalization**			**Final Result**	
	O1	O2	O3	Ave Weight	Ranking
O1 - Regulatory Requirements	1	1.5654	1.7155	0.4501	1
O2 - Meeting Green Building Standards	0.6388	1	1.0959	0.2875	2
O3 - GFA Concession	0.5829	0.9125	1	0.2624	3

Table 10 - Weighting value - Micro Factor: Financial

Criteria (Financial)	**Micro-Factor – Normalization**				**Final Result**	
	O4	O5	O6	O7	Ave Weight	Ranking
O4 - Cost Saving on Operation & Maintenance	1	1.5771	1.7087	1.7125	0.3567	1
O5 - Price Premium	0.6341	1	1.0835	1.0859	0.2262	2
O6 - Monetary Incentives to Owners	0.5852	0.9230	1	1.0022	0.2088	3
O7 - Monetary Incentives to Professional	0.5839	0.9209	0.9978	1	0.2083	4

Table 11 - Weighting value - Micro Factor: Non-Financial & Altruistic

Criteria (Non-Financial & Altruistic)	**Micro-Factor - Normalization**			**Final Result**	
	O8	O9	O10	Ave Weight	Ranking
O8 - Job Opportunities	1	1.2118	1.3555	0.3902	1
O9 - Customized Incentives	0.8252	1	1.1186	0.3220	2
O10 - CSR	0.7377	0.8940	1	0.2878	3

Table 12 - Weighting value - Micro Factor: Internal

Criteria (Internal)	**Micro-Factor - Normalization**				**Final Result**	
	O11	O12	O13	O14	Ave Weight	Ranking
O11 - Improve Corporate Reputation	1	1.8190	1.9747	1.7501	0.3806	1
O12 - Long Term Business Competitiveness	0.5498	1	1.0856	0.9622	0.2092	3
O13 - Indoor health & productivity enhancement	0.5064	0.9211	1	0.8863	0.1927	4
O14 - Priority review of green projects	0.5714	1.0393	1.1283	1	0.2175	2

Table 13 - Weighting value - Marco Factor

Criteria	**Marco-Factor - Normalization**					**Final Result**	
	Political	Financial	Non-Financial	Internal	Technological	Ave Weight	Ranking
Political	1	1.3021	1.2670	1.2415	1.0578	0.2321	1
Financial	0.7680	1	0.9730	0.9534	0.8124	0.1783	5
Non-Financial	0.7892	1.0277	1	0.9798	0.8349	0.1832	4
Internal	0.8055	1.0489	1.0206	1	0.8521	0.1870	3
Technological	0.9453	1.2309	1.1978	1.1736	1	0.2194	2

Table 14 - Weighting value - Micro Factor: Political

Criteria (Political)	**Micro-Factor - Normalization**			**Final Result**	
	C1	C2	C3	Ave Weight	Ranking
C1 - Lack of Government's Promotion	1	2.2891	1.5190	0.4773	1
C2 - Insufficient Incentives	0.4369	1	0.6636	0.2085	3
C3 - Insufficient Public Awareness & Education	0.6583	1.5069	1	0.3142	2

Table 15 - Weighting value - Micro Factor: Financial

Criteria (Financial)	**Micro-Factor - Normalization**			**Final Result**	
	C4	C5	C6	Ave Weight	Ranking

C4 - Long Payback Period	1	1.7797	1.1138	0.4066	1
C5 - High Maintenance Costs	0.5619	1	0.6259	0.2284	3
C6 - High Hidden Risk on Costs	0.8978	1.5978	1	0.3650	2

Table 16 - Weighting value - Micro Factor: Non-Financial

Criteria	**Micro-Factor - Normalization**				**Final Result**	
(Non-Financial)	C7	C8	C9	C10	Ave Weight	Ranking
C7 - Aging of Existing Building	1	1.0842	1.1268	1.0970	0.2687	1
C8 - High Density	0.9224	1	1.0393	1.0118	0.2479	2
C9 - Comprehensive Use of Lighting and Air-con	0.8875	0.9622	1	0.9735	0.2385	4
C10 - Ignore Water Saving	0.9116	0.9883	1.0272	1	0.2450	3

Table 17 - Weighting value - Micro Factor: Internal

Criteria	**Micro-Factor - Normalization**			**Final Result**	
(Internal)	C11	C12	C13	Ave Weight	Ranking
C11 - Lack of Integration among Different Project Parties	1	0.9626	0.8773	0.3146	3
C12 - Hard to Understand BEAM Plus Standards	1.0388	1	0.9113	0.3268	2
C13 - Intricacy on Application	1.1399	1.0973	1	0.3586	1

Table 18 - Weighting value - Micro Factor: Technological

Criteria (Technological)	**Micro-Factor - Normalization**			**Final Result**	
	C14	C15	C16	Ave Weight	Ranking
C14 - Lack of Gree n Building Tech nologies	1	1.3356	1.3339	0.4003	1
C15 - Lack of G reen B uilding Professionals	0.7487	1	0.9987	0.2997	3
C16 - Insufficient Tech. Skills of Working Levels	0.7497	1.0013	1	0.3001	2

7. Suggested Solutions

After the AHP analysis, quantitative calculation of the questionnaire data and the qualitative measure, face to face interviews, the main challenges faced by the implementation of BEAM Plus are Political factor, followed by technological factor. Due to this reason of important role of government, the HK government should actively promote and facilitate the expansion and development of BEAM Plus. Funding can be given to those developers who have the enthusiasm and thorough proposal in constructing the green building. Regulatory requirement and procedure in applying the standard and the threshold can be relieved in order to attract more investor to invest on it. The HK government can also focus on educating the people about the importance of building a green environment, including the green society and green buildings. Besides, more skilled and experienced workers and professionals can be input from other countries to enhance the knowledge and building technique of the green buildings. The developers can also employ some consultants to give advice and technical solution before the construction stage and to the green construction project started. More hardware, such as building machine, can be introduced and bought in the construction process to improve tackle the technical difficulties. The HK government can also put more resources in education about the training the workers and creating more technical professionals in green project. Since political factor and the meeting regulatory requirements are the most critical factors in motivating others to implement BEAM Plus and other green practice, it is suggested to apply “Carrot and Stick” into the developers or owners side.

In long term, the government shall incorporate the green building practices into the master plan of the city and linkage the percentage of GFA concession with the BEAM Plus rating so developer utilize their capacity to achieve what they can in order to meet the GFA concession instead of just meeting the unclassified level. For those who only meet the unclassified level, punishment such as penalty will be applied. Also, the developer/owners of the building can apply Internet of Things (IoT) into the new buildings. More focused measures are necessary to foster greater awareness among tenants and/or occupants. The government, developers and owners can put more efforts beyond the building structures in green concept and hardware to focus more on end users, which are the tenants and the residents. From the developer/owner side, they can collect the big data from the end-users and which can be a valuable

VOC for developing more constructive measures for green living and improving the products and services that the developer provides. Also, by changing their energy consumption behavior and practices proactively, tenants and occupants can also be part of the solutions rather than the problems. The tenants or occupants can easier to measure the benefits or efforts they have input through IoT. Besides, many professionals from the face to face interview pointed out that the BEAM Plus standard to too complicated to understand and the criteria are not all relevant to HK situation. The Council should simplify the standard for the stakeholders easier to understand and follow and need to review all the criteria from time to time to make sure the tool is capable in HK. Lacking of public awareness is also the key reason of the low demand of the green building. Therefore, promoting the benefits of the green building and conducting more promotion campaign to the public are critical task for HK government.

8. Conclusion

This paper aims at studying the opportunity and challenge of implementation of BEAM Plus in HK through a thorough research of literature review, AHP analysis and structured interview. Having a comprehensive study of literature, research paper and report, we conclude numbers of opportunities and challenges of implementation of green practice. By using the AHP analysis and quantitative calculation, under the macro level, the top two opportunities are Political factor and Altruistic factor. It implies the government is really acting an indispensable role in affecting the growth of BEAM Plus and green project. Job opportunity is also anther elements and motivator that BEAM Plus could bring to the society. On the other hand, the top challenges are Political factor and Technological factor under the macro level. Without the help of government, it is hard for BEAM Plus to be succeeded. Technical difficulties, such as lack of skills labor and sophisticated machine, are also the obstacle hindering the development of BEAM Plus. Under the micro level, the top opportunity under Political factor is "Meeting regulatory requirements". Ease of procedure and regulation would be a greater motivation of BEAM Plus implementation. Besides, the top opportunity under Non-Financial & Altruistic factor is "Job opportunities created to the society". On the other hand, the top challenge under Political factor is "Lack of Government's Promotion". The last but not the least, top challenge under Technological factor is "Lack of green building technologies". It shows the essential and importance of government's policy and the experts and professionals.

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