AN EVALUATION OF SUSTAINABILITY IN FACILITY MANAGEMENT FOR GREEN BUILDING OPERATIONS

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Accepted: 09.02.2024 **Published**: 01.03.2024

Keywords: Facility Management, Green Building Operations, Green Facility Management.

Abst ract

This study leads a far-reaching assessment of maintainability rehearses in office the executives, zeroing in explicitly on their suggestions for green structure tasks. The structure business has encountered a far-reaching progress towards green structures and thus a developing requirement for green offices experts to expand green structure expected regarding energy effectiveness, water protection and waste decrease in their functional stage. Green structures have one of a kind innovative framework that require office chiefs to have significant information and abilities to lead legitimate offices the board and support wanting to boost the capability of green structures. It is significant, then, to examine whether information holes for office supervisors exist as for green structures, and provided that this is true, how these information holes could be crossed over. However, a few examinations have explored the activity and upkeep cycles of green structures, hardly any investigations considered office supervisors' information and abilities with respect to green office the board (GFM). This study, which is focused on Hong Kong, aims to conduct a more in depth investigate into the knowledge and skills of office administrators in charge of managing green buildings locally. It will also look at the apparent differences between regular and green buildings, the challenges associated with GFM, the information gaps in GFM and the underlying causes, as well as potential solutions. Accordingly, this paper determines conceivable answers for span the information holes, for example, laying out all encompassing endowments for those office administrators taking part in preparing projects of GFM.

Paper Identification

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1. Introduction

In modern office board exercises, manageability has emerged as a fundamental concept, particularly in the area of green structure tasks. As the global community struggles with the pressing issues of resource depletion, ecological corruption, and environmental change, the artificial climate plays a crucial role in shaping a more realistic future. Office the board is at the forefront of this paradigm shift as a fundamental component of building duties, necessitating a thorough evaluation of supportability approaches to improve ecological execution, social responsibility, and financial reasonability.

The motivation behind this study is to dive into the complex parts of supportability in office the board, explicitly inside the setting of green structure tasks. Green structures are planned and built with an emphasis on limiting their natural effect, enhancing energy proficiency, and advancing inhabitant prosperity. Office supervisors are entrusted with guaranteeing the consistent incorporation and continuous execution of these green structure highlights, introducing the two difficulties and open doors for supportable practices.

The assessment of manageability in office the board envelops a range of contemplations, going from the underlying plan and development stages to the everyday tasks and long-haul upkeep of green structures. It requires an all-encompassing methodology that adjusts natural stewardship, social value, and monetary possibility. The unique idea of office the board, combined with the developing scene of feasible practices and innovations, highlights the requirement for a thorough assessment of techniques, best practices, and expected regions for development.

In this investigation, we will examine different elements of maintainability in office the board for green structure tasks. This incorporates the execution of energy-productive frameworks, the reception of environmentally friendly power sources, squander the board methodologies, water preservation measures, and the reconciliation of savvy advancements to upgrade functional proficiency. Moreover, consideration will be given to the job of office chiefs in encouraging a culture of supportability, drawing in partners, and guaranteeing consistence with green structure guidelines and certificates.

At last, this assessment means to contribute important bits of knowledge to the talk on manageability in office the executives, giving an establishment to informed navigation and encouraging a more profound comprehension of the difficulties and open doors intrinsic in overseeing green structures. As the fabricated climate keeps on developing, the significance of maintainable office the board rehearses couldn't possibly be more significant, making this study an opportune and fundamental commitment to the more extensive discussion on making ecologically mindful and strong constructed spaces.

2. Literature Review

Ade and Rehm's (2020) studied give a special viewpoint on the development of green structure rating devices by looking at the unwritten history from the perspectives of key figures in the field. By digging into the individual encounters of the 'principal architects,' t he creators shed light on the verifiable turn of events, challenges confronted, and examples learned in the making of these apparatuses. This study contributes important experiences into the relevant foundation and inspirations that formed the advancement of green structure rating apparatuses.

Akhanova et al. (2020) addressed the requirement for extensive maintainability evaluation structures with regards to building projects in Kazakhstan. Their review presents a multi-standards dynamic system that considers different variables impacting building supportability. By integrating different measures, the structure gives an all-encompassing way to deal with assessing maintainability, taking care of the particular setting of the locale. This

exploration adds to the comprehension of custom-made manageability appraisal approaches for various geological and context-oriented settings.

Chi et al. (2020) examined development squander minimization rehearses inside the setting of green structure, looking at LEED-NC 2009 affirmed projects in the US and China. The review gives a relative examination of waste decrease procedures, featuring similitudes and contrasts in the execution of green structure rehearses between these two nations. By recognizing fruitful methodologies and difficulties looked in development squander minimization, the exploration adds to the continuous worldwide endeavors to diminish ecological effect in the development business.

Collins and Junghans (2015) checked out at the fundamental system of associations towards useful workplaces the board and green leasing. The audit dives into how affiliations coordinate practicality into their office the chief's practices and leasing procedures. By researching the association level perspective, the assessment uncovers understanding into the motivations, troubles, and benefits related with embracing viable practices in workplaces the board and leasing. This study gave pieces of information into the fundamental considerations of associations hoping to change their undertakings to sensibility targets.

Darko et al. (2017) centered around the drivers behind the reception of green structure advancements through a global review of specialists. The review distinguishes key variables persuading the execution of green advances in development projects. By understanding the points of view of specialists in the field, the examination adds to a more profound cognizance of the powers molding the mix of practical advancements in the development business. The discoveries are essential for policymakers, industry experts, and scientists expecting to advance the boundless reception of green structure innovations.

Debrah, Chan, and Darko (2022) researched the green money hole inside the setting of green structures. The review gives a perusing survey, looking at the difficulties and hindrances related with funding green structure projects. By distinguishing holes in green money, the exploration adds to understanding the monetary imperatives obstructing the far-reaching reception of feasible structure rehearses. The concentrate likewise frames future examination needs, making ready for additional investigation and expected answers for span the green money hole in the development business.

3. Research Methodology

In order to gathered both qualitative and quantitative data, this study developed an evaluation philosophy and related research hypotheses. This is done through a review conducted by managers of nearby workplaces and by speaking with government subject matter experts and managers of workplaces. Content assessment was used to handle the profound social affair information, while informative assessments and one model t-test were used to analyze the focus on information. Incorporating both local and quantitative data facilitates cross-underwriting and guarantees a more thoughtful assessment.

3.1. Methods of research and formulation of hypotheses

As shown in Table 1, this study poses six conjectures to evaluate the GFM's consideration, difficulties, and information gaps. A one model t-test with an importance level of 0.05 was adopted to test the six hypotheses, and a study was conducted to collect quantitative data for the testing. Following the overview, interviews were designed to give survey participants—who were also welcomed to be government-trained professionals—the opportunity to

comment further on the ongoing state of affairs and information gaps in GFM. The outcomes of the social events and review were then combined and distinguished from the permit cross-underwriting.

3.2. Questionnaire survey

The majority of chiefs of adjacent working environments coordinated an audit overview to protect the quantitative information mix. The study's requests were made with the implications of the formative survey and the evaluation point of this review in mind. The purpose of this study is to identify the ways in which employers distinguish between regular and green plans in the workplace, as well as the challenges associated with GFM, its knowledge gaps and the important factors that contribute to them, and the ways in which these gaps may be exploited. These fundamental objectives are covered by the survey's requests. Furthermore, in order to provide context for the six theories listed in Table 1, the review also had to provide six requirements that clearly distinguish themselves from the six hypotheses on their own. The review should consider the Hongkongn context as well in order to make it absolutely relevant to work environments administrators in Hongkong. The final draft includes a total of 22 solicitations divided into 4 sections: 1) general information about the chief work environment; 2) the board work environment; 3) the significance of green information and limits established; and 4) the establishment of green limits, the specifics of which are as per the proceeding.

Table 1:List of research hypotheses.

Category	Code	Hypothesis
Knowledge about GFM	H1	A green building's ability to function is mostly determined by its facilities management system, not just by its architecture and construction.
	H2	There is a difference between non-green and GFM.
Challenges with GFM	H3	Certain architectural elements, like light shelves, vertical vegetation systems, and shading mechanisms, make green buildings more difficult to maintain.
A deficit in GFM knowledge.	H4	When it comes to making the shift from managing non-green to green buildings, the facilities management industry is facing a green skills shortage.
	H5	Early system failures might result from a lack of understanding and expertise in managing green building technology and systems.
	H6	During the operation and maintenance phase, green buildings with insufficient knowledge and abilities will operate poorly.

- The respondents' general information and support were obtained in Part A, with the aim of understanding the extent of people's overview knowledge of the supervision of both green and non-green plans, as well as the green confirmations they possess.
- Green maintenance concerns and the distinctions between green and non-green schemes are covered in Locale B's inquiries. The hypotheses H1, H2, and H3 were investigated in this section.
- The consequences of not having enough knowledge and green restrictions were examined in Piece C. This contributes to the understanding of the value of green information and boundaries, bolstering the necessity of enabling managers in work contexts to enroll in green demand courses. Here, the hypotheses H4, H5, and H6 were investigated.

- Respondents were required to answer inquiries on preparing for green capacities in Section D. For example, they had to address how much they would spend on each worker's advancement toward green capacities.

Experts from the workplaces where the leaders operate make up the vested groups for the review outline. In order for industry experts with experience in both norm and GFM to be properly blended, it was necessary to identify and separate verified green professionals in Hongkong so they could relate to the model. Plans of guaranteed Green Etching Supervisors (GMM), Green Etching Field Managers (GMFM), and Green Etching Subject matter experts (GMP) obtained from BCA were examined as needed to determine appropriate participation affiliations. As shown in Table 2, a combined total of BCA certified green specialists should be apparent.

Table 2:Total number of BCA-certified green professionals.

Certification	Number of Certified Personnel	As of
Manager of Green Marks	715	15 July 2015
Facilities Manager for Green Mark	160	3 August 2015
Green Mark Expert	75	15 July 2015
Total	950	

In order to provide verified green workplace managers with the necessary information to oversee green designs and workspaces, interest associations were selected and compiled for each of the three records. In addition, association regions were considered to guarantee that they had a place in one of the ongoing areas — offices for the chiefs, land and properties, plans and preparation, laborers to hire, and designers. However, because not every workplace supervisor in the selected associations had a certification, this analysis process made sure that the model contained associations that had at least one green affirmed capable worker.

3.3. Telephone and in-person interviews

Up close and personal and telephone interview approaches were taken on for of subjective information assortment technique, which assists with disposing of equivocalness and give the open door to interviewees to offer their viewpoints while responding to study questions. Six subsequent meetings were led with review respondents who were ready to take part in the meetings and chose as experienced offices the board experts. Further, 2 extra meetings were led with delegates of a legal board that directs and assumes an essential part in the advancement of GFM. Among these eight meetings, 3 were eye to eye interviews, while five were carried out by telephone because of members' timetable requirements. Interviewees An and B, who represent a legal leadership group in the structure industry, shared their insights on how to enhance legislative tactics and the rationale and approachability of the promoted green confirmation courses.

The BCA verified the green expertise of four out of the six interviewees: two were not, and three were Green Imprint Offices Directors (GMFM) and one was a Green Imprint Administrator (GMM). To gain a more comprehensive knowledge of the various information bases maintained by verified and unverified individuals, more meetings can be arranged with these two groups. Furthermore, the screening makes it possible to acknowledge the ongoing work that significant partners conduct. The eight interviewers' profiles are shown in Table 3.

Table 3: Profiles of the interviewees.

Code	Job Title	Job Function	Type of Interview
A*	Senior Manager of Technology Development Group and Green Mark Department (Existing Buildings)	Green Technology	Face-to-face interview
B*	Head of Graduate Development and Management School	Academic and Administration	Phone interview
C	Expert in Facilities Management	Facilities Management	Face-to-face interview
D	Infrastructure Officer for Senior Facilities Management Planning	Facilities Management	Face-to-face interview
E	Deputy Chief Executive Officer	Facilities Management	Phone interview
F	Engineer for Facilities	Facilities Management	Phone interview
G	Manager of Executive Properties	Facilities Management	Phone interview
H	Expert in Facilities Management	Facilities Management	Phone interview

The information from the meeting was guided and thereafter examined by a satisfied examination. The focus of a subjective substance evaluation is the text's logical significance, regardless of its format—verbal, print, or electronic. Subjective substance assessment can be divided into three categories: summative substance examination, coordinated content examination, and conventional substance investigation. Coordinated content analysis was used in this review to analyze the meeting materials. Scientists use current hypotheses in coordinated content analysis to identify important concepts as coding classes. Given how the meeting records in this study were categorized into mindfulness, challenges, information gaps, and crossing over information holes of GFM, in comparison to the poll structure, coordinated content examination can also be referred to as logical substance investigation. The outcomes of the meeting and the survey might then be examined and cross-approved.

4. Research Results

4.1. Overview of results and respondent profile

A total of 125 responses were received after 300 mails were sent to selected participating associations in the public and private spheres. Fifty of the 125 research reactions were broken up and then excluded from the example, which further ensures that the quantifiable results are precise. As shown in Table 4, in order to obtain a more diverse pool of respondents, the survey was distributed to the offices of board branches of organizations from different places. This could be explained by the fact that after the Green Imprint Plan was submitted in 2005, the number of green buildings in the neighbourhood building sector just started to increase. Therefore, when compared to GFM, most office supervisors will often be more involved with traditional offices and the board.

Table4: Profile of participating companies by industry/sector

Sector / Industry	Number of Respondents	Percentage
Builders	4	4.4%
Properties & Real Estate / Developers	16	15.6%

Engineering and Design	6	6.5%
General Facilities Management	47	49.1%
Facilities Administration (Traditional)		
- Medical Care	6	6.5%
- mining	3	3.3%
monetary establishments	5	5.5%
Tourist Attractions	4	4.4%
Academic Establishments	9	4.7%
Total	**100**	**100%**

Workplaces that have board professionals with experience in both standard and GFM will surely understand the differences between designs that aren't permanently green. A total of 84 survey respondents (96%) are knowledgeable about both GFM and non-green. As a result, during the course of the study plan, they are able to provide more thorough and precise answers. According to their job levels, participating respondents were similarly arranged, and as Figure 1 illustrates, 49 of them (54%) held a position at the Positioning Chief/Boss/Gathering Trailblazer level. Of the 49 responders, 32 are directors and 17 are positioning chiefs.

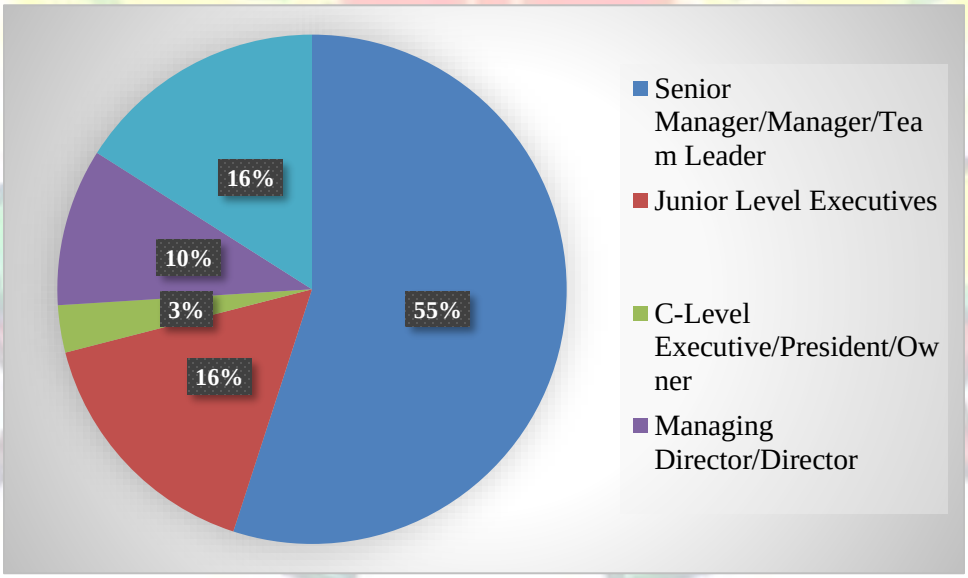

Figure1: Participating respondents' percentage profile—job level.

Overall, the majority of respondents agree with the remarkable circumstance of the solicitations, as demonstrated by Table 5's display of the valid evaluation, which reveals that all methods for the speculation inquiries is a greater priority than the test worth of 3. Because the results of SPSS encounters are of two-followed importance and a one-followed one model t-test is necessary, the result p-respect is essentially separated in order to convert the two-followed test into a one-followed test. This calculation technique is used as needed for every SPSS result. The one-model t-test is very significant at the 0.05 significance level. In addition, standard error of the means (SEMs) are examined since they provide a measure of how much the model mean deviates from the average for all data points, which aids in the information testing process. The significance of the standard error decreases with test size and is not fixed in stone by dividing the model standard deviation by the square base of the model size. Thus, the more

modest the SEM, the more certain the evaluations are, indicating a more precise percentage of the parametric mean. Given that the SEMs are so tiny, this implies a very careful examination of everyone.

Table 5: Likert scale questions—one sample t-test.

	Test Value = 3						
	Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
						Lower	Upper
H1	5.09	.763	.082*	.000**	2.069	1.93	2.25
H2	5.12	.544	.059*	.000**	2.102	1.98	2.23
H3	5.13	.610	.066*	.000**	2.113	1.99	2.26
H4	5.09	.652	.070*	.000**	2.069	1.95	2.22
H5	5.19	.606	.066*	.000**	2.169	2.06	2.30
H7	5.35	.563	.060*	.000**	2.335	2.24	2.47

The sub-sections that follow provide an overview of the investigation in depth, including topics such as executives' knowledge with green structure offices, GFM problems, information gaps in GFM, and potential solutions to close such gaps.

4.2. Knowledge of green building facilities management

Green designs have phenomenal likely in accomplishing significant and hypothetical benefits, similar to energy and water hold reserves, restricting waste, further growing for the most part work quality and redesigning occupant prosperity and comfort. A different choice inquiry was planned to investigate how workplaces bosses sort out the benefits of green designs.

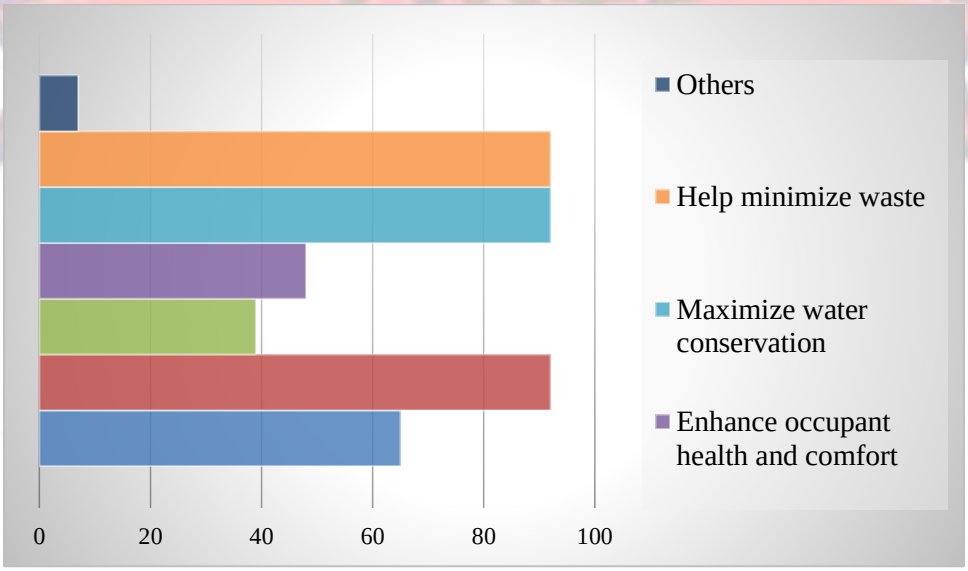

Figure 2:characteristics that a green building should have or contribute to.

As illustrated in Figure 2, every single one of the 100 respondents felt that a green design ought to assist waste reduction, water and energy security, and both. However, fewer respondents—those aged 39 to 65—thought that

green designs should also contribute to save operating costs, improve work quality and occupant effectiveness, and modernize occupant comfort and prosperity. This mirrors the belief held by the majority of workplace chiefs, which is that natural sensibility is more important to green design than social and financial legitimacy. As anticipated for building characteristics, respondents An and C state that energy efficiency and consumption represent one of the most precise ways non-unendingly green designs differ from one another. Interviewee An additional study showed that, apart from green designs, energy-holding reserves are typically provided by green retrofits for conventional construction, and energy expenditures will typically decrease, unless there is a significant shift in the design's intended use.

4.3. Challenges with GFM

Because the p-value is less than the predetermined significance criterion of 0.05, the third unfounded hypothesis is also eliminated. This demonstrates that green buildings with certain green compositional viewpoints can really withstand greater challenges. From then on, the respondents were asked to select five elements from a list of seven and ask them to be ranked in order of significance or inadequacy based on how they related to difficulties in maintaining green designs. "Lacking experience, readiness, and data" is recognized as the most major component adding to difficulties, with a mean score of 4.20. "Unseemly upkeep organizing/the chiefs" is positioned as the second most significant component, with a mean score of 3.45. A potential clarification for this outcome could be that upkeep arranging and the board are connected with one's degree of interest, readiness, and information. It is certainly going to be hard for an office boss to effectively oversee upkeep booking and the leaders for green designs without the important green ability and data.

The respondents likewise firmly accept that plan defects (like the arrangement's negligence of a reasonability stance) are a convincing component in supporting difficulties. As green designs incorporate compositional parts like light resigns, daylight-based chargers, and vertical vegetation, it is pivotal to guarantee that reasonableness issues are considered during the arranging stage. It's important to remember that the planning and development stage and the action and support stage are related and shouldn't be handled separately. Interviewee C stated that "with respect to plan and improvement, various affiliations have pushed ahead to recall examinations for how to function finally, as everything is integrated." According to Interviewee C, adventure group leaders could peruse the green-guaranteed workplaces at the start of the planning/readiness phase. Albeit this is unequivocally suggested, no principles or strategies have been laid out to do the early contribution of office bosses in the arranging phase of a development project. In this manner, it is recommended that toward the beginning of the venture's preparation and arrangement stage, the design and the board organization could both mutually pick the gold of green ensured office managers. This will empower conversations with respect to the reasonability and activity of different green systems and parts to happen right off the bat in the task, permitting the arranging gathering to think about these variables.

4.4. Gaps in knowledge regarding GFM

The fourth false hypothesis is also disregarded since it seems that a green capacity is opening up in the leaders' local workplaces. This outcome upholds the conclusions drawn from a review of the deficiency of green data and capabilities within the board business's workspaces.

The t-tests validate the excess hypotheses, which aim to illustrate the consequences of insufficient green data and capacities. To be more precise, 82 workplaces the board professionals (91.1%) agreed/immovably agreed that a

deficiency of green data and capacities set can cause early system frustrations out of the 90 gathered responses. This conclusion can be attributed to the possibility that a lack of green data and skill sets will affect how workplace managers manage green innovations and systems and may even prevent the advancement of green designs and their demonstration during the O&M phase. Interviewee D further supports this by saying that "We should be able to understand specific green elements, such as how some of these features operate, for workplaces that incorporate green designs. If the manager at work alters the boundaries without real notice, there won't be as much energy saved and the construction won't be as interesting." Similarly, interviewee G has demonstrated that "a workplace manager's job is to oversee a fair help plan; in order to do so, he or she must organize the structures, identify warning indicators of a breakdown, and so on. If managers don't have access to data on these systems, they could not be aware of the long-term self-destruction of these green structure execution and capability systems."

However, it's also critical to note that supervisors at work don't necessarily need to possess a wealth of specific knowledge to oversee green design initiatives. Considering everything, green innovations and systems are often monitored and maintained by clear-cut expert centers that possess the primary specific capabilities to accomplish so. However, in order to perform the duties of a workplaces chief in Hongkong effectively, one would also need to be able to identify system failure signals and have an appreciation for the Green Engraving layout, regulations, green designs, floats, and the stray parts of green advancements and structures. Once a workplace manager has these basic information and skills, they can provide a nice maintenance schedule and effectively manage green workplaces.

4.5. Filling in the knowledge gaps

Managers of work environments must improve their understanding of GFM as this study has identified a gap in knowledge. One way to do this is by adopting green statement and preparatory courses. The level of interest in the courses may depend on how work environment directors feel about the BCA's brief summary of the green affirmation courses, specifically GMM, GMFM, and GMP. Almost none of the 100 respondents demonstrated a lack of concern for any of the advanced green statement courses. Therefore, it makes sense to assume that employers in Hongkong are more involved in the green statement courses that BCA offers. This could be explained by the fact that BCA has consistently tried to advance these courses within the industry. Through the creation of roadshows and get-togethers like the Hongkong Improvement Efficiency Week, Overall Green Plan Get-together (IGBC), and BCA Green Office Spring up, BCA has consistently attempted to interact with affiliations and industry professionals.

This study has also looked into the best type of preparation for supervisors in the workplace. The results demonstrate that, when given the choice between homeroom or educator-driven preparation, managers prefer it in work situations. Hinting Figure 3, an understanding that could be made sense of because of time necessities, where e-learning stages offer more prominent comfort to typical working grown-ups. With involved preparing, work environments directors constantly need to get the hang of thinking about consideration and depend upon their tutors' information. Such a methodology takes time and depends with the getting a handle on that the information surrendered by the tutors is cautious and surprising. As necessary, this could sort out why most working environments executives could manage without to go through involved preparing and self-learning.

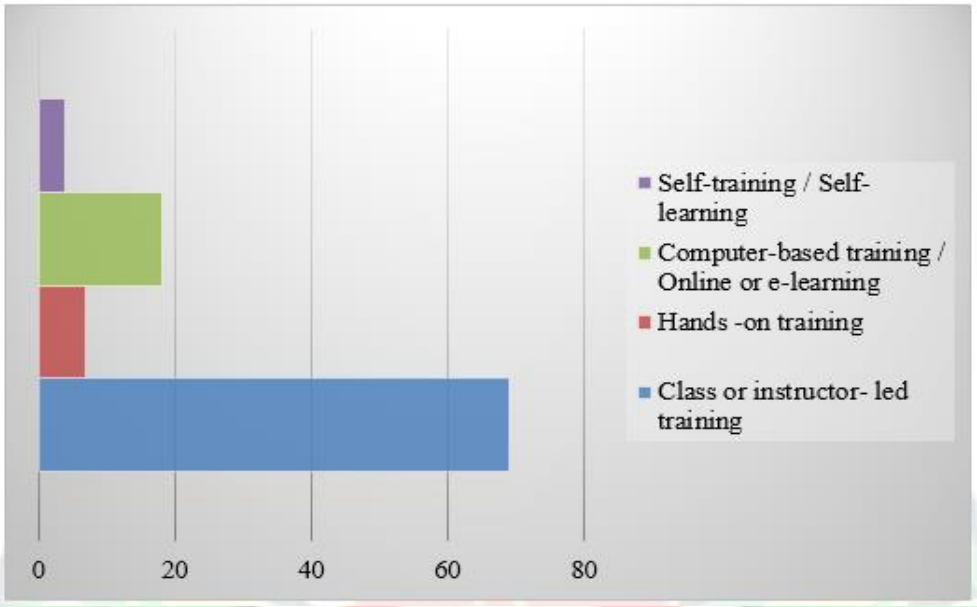

Figure 3: Training program methods/techniques.

Since the majority of respondents support the establishment of regular review corridors, one important factor that will influence a person's eligibility for green affirmation courses is the expense that their employer will incur. The findings demonstrated that all 100 respondents (100%) would complete the green arrangement and endorsement courses, recognizing that their association would support the course fees, even though the green readiness and authentication courses offered by the major administrative affiliations are not required. The hefty course fees required for people to enroll in green endorsement courses may provide light on this. Figure 4 illustrates that sixty respondents thought it reasonable for a course to cost between $200 and $500, and only five said they could afford to spend more than $1,000. The outcome unquestionably includes the need for additional prodding from the government or relationships to encourage people to enroll in green license programs.

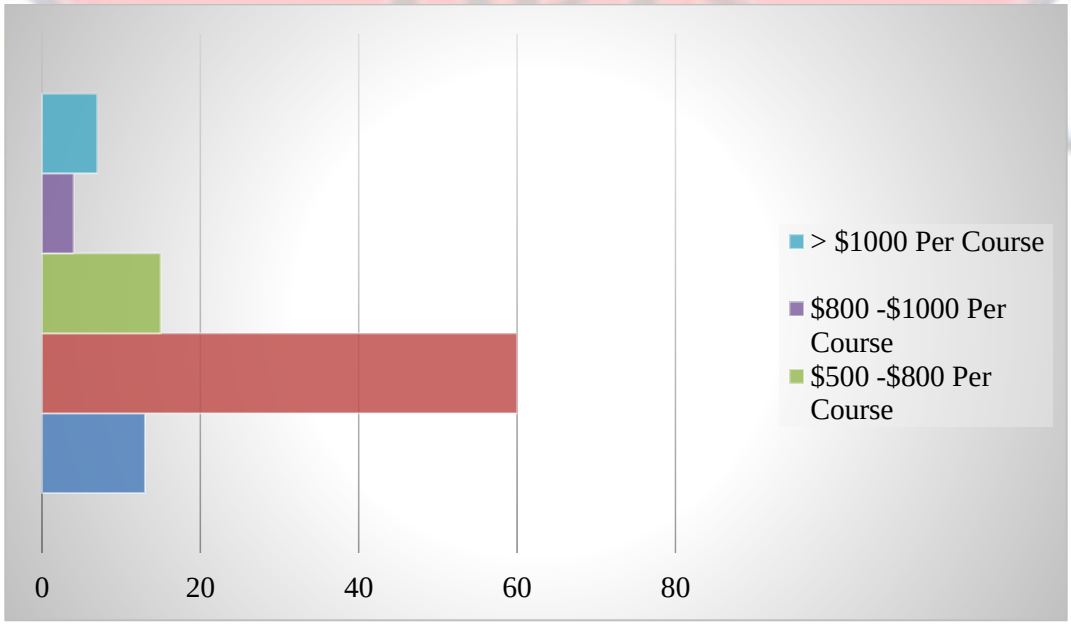

Figure 4:The price range for green certification courses is seen by many as reasonable.

However, BCA had consistently attempted to connect with associations and people in regards to the significance of green structures and green abilities overhauling, obvious from this concentrate course expenses have a gigantic impact in people's readiness to go to green certificate courses.

5. Conclusion

This examination of adequacy in office the board for green development endeavors includes the critical significance of embracing and updating earth cognizant practices inside the established climate. This study was embraced to take a gander at the green information opening in the working environments the boss's business by enduring Hongkong for instance, and by exploring conceivable strategies that can assist with beating any obstruction using both quantitative (frame review) and dynamic techniques (exceptionally close and telephone interviews). It was perceived that working environments administrators see developing energy and water security and limiting waste as the most undeniable highlights of green plans, which they recognize, don't be guaranteed to require reliable expenses and HR. They additionally recognize GFM and standard working environments the pioneers are fundamentally unique considering the extraordinary mechanical frameworks utilized in green plans which require new information and limits. It has been perceived that lacking experience and information, not suggested upkeep sorting out, and an imprudence for the assistance point of view in plan are the essential three most crucial parts inciting challenges in green work environments the board. The t-tests legitimized that insufficient green limits and information can prompt early framework disappointments and forgetting to compare presumptions green plans during the O&M stage. This concentrate consequently showed that no matter what the way that most working environments bosses are natural the different open studios on GFM and favor the standard homeroom based arranging programs, the deficiency of readiness to pursue paid courses without affiliation enhancements was perceived to be a major part adding to the restricted interest for green certification courses among work environments the board trained professionals.

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