Smart Vertical Garden Application on Exterior Building Supporting Environment

To cite this article: D A Wahab and T Munandar 2018 IOP Conf. Ser.: Mater. Sci. Eng. 407 012181

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Smart Vertical Garden Application on Exterior Building Supporting Environment

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Abstract. The purpose of this research is to provide great influence for the weather conditions and the environment. The literature study method used to take information from some reading materials on the internet site. The material is processed to obtain information that can analyze the problem and to get the settlement and get the development of the method. The result showed that the application of SVG (Smart Vertical Garden) on the building wall of Bandung city would improve the air quality because the plants will filter the air around the city. In addition, Vertical Garden is also able to reduce the intensity of noise to 68 dB, so that the activities of Bandung residents are not disturbed because of the sound of the vehicles.

1. Introduction

According to Kinghorn, Vertical garden is an invention relates to structures for growing plants, and more specific to a vertical garden in which a plurality of plants. It may be arranged in a generally vertical orientation or simply arrange plants vertically for a number of purposes for example, to minimize floor space, to take the greatest advantage of existing light, or to simplify care or irrigation of the plants. Thus, a vertical orientation may be provided for effectively displaying a number of plants with arranges it based on different colour and kind of plants to make some patterns that pleasing whoever sees it [1].

In addition to the vertical garden, Vertical garden usually applied on the exterior building wall. Exterior building wall construction having the usual stud wall comprising a plurality of spaced, vertically arranged stud members extending between horizontal top and bottom plates covered on both sides by sheets of interior and exterior sheathing material [2].

Gottlieb brothers in their research describes about the system of vertical gardening. There are some steps in build vertical garden system. But, the research mostly talks about the technical side of vertical gardening system including reservoir that contain nutrient rich liquid for the plants, the pipe to that integrated with the reservoir, how to setting the air pump or where to place it and many more to make it effective in maximize the function of the vertical gardening [3].

Williams in his research focus on the general information about vertical gardening. The research is more practical than the other references basically its research suitable for the beginner of vertical gardening such as framing and delivering water to the growing medium and hanging technic [4].

Bribach and Rossomano in their research explain about vertical garden as an invention of the planter system for supporting living plants on vertical surface and the medium of vertical plant and focus on the maintenance of the plant after applying the vertical gardening [5].
From the references above, there is no information about the significant advantage if the Vertical Gardening applied on the city walls of the cities.

Nowadays the climate becomes worse the changing of the weather is unpredictable and the vertical garden has many advantages especially for low-rise buildings in moderate and hot climates [6]. The trend on architecture and construction also changing with environmental and social criteria are considered at the same level of aesthetics, economic and functional ones [7]. Here the study design to investigate whether smart vertical garden can create a significant changing to the weather and environment condition in Bandung city. There is a lot of information on the internet site about vertical garden that explain the advantages of applying smart vertical garden on the exterior building. Smart vertical garden is an invention for the future from nature to the city [8] because the vertical garden has portable garden structure with only the support of large plastic bag and soil [9]. The final result of the application of smart vertical garden is to help reimagine the shape of modern city to meet the urgent challenges of this century [10]. One of the benefits on applying this smart vertical garden is clean the air condition and reduces the noise in the big city such as Bandung.

2. Methods
A scientific paper is written using the literature study method by taking information from some reading material on the internet site. The material is processed to obtain information that can analyze the problem and to get the settlement and get the development of the method.

3. Results and Discussion
The concept of a vertical garden planting space can be larger than a conventional garden, even the number of crops can be planted several times, so it can add green space significantly. Vertical Garden can be applied in various buildings (outdoor as well as indoor), fencing, carport, and other limited walls. it looks more beautiful and not monotonous in the form of a hard wall, but it is more natural and it can even be resembling a very artistic painting Some plants that are frequently used i.e. adiantum (adiantum), Paris, Lily nail horns, phytonia, bromeliads, kadaka, Horn, ivory, deer fern Boston and many more (Figure 1).

The benefits of using Smart from Vertical Garden are:
- Increasing oxygen supply, Smart Vertical Garden Plant is able to produce oxygen-rich gas in an effort to meet the needs of oxygen around the creature.
- Smart Air vertical garden has the ability to reduce solar radiation and is able to moisten the air temperature around the plant to reduce extreme temperatures and cool the air.
- Air Filter Plant vertical garden is able to filter and absorb contaminated air due to vehicle fumes or road dust such as Aglaonema, dracena, ficus, sansevieria, clorophytum, chamaedorea, spathiphyllum, philodendron, aloevera, scindapsus, bephrolepis, moses and anthurium.
- Vertical garden noise reducer is also able to muffle 68 dB sounds so as to create a conducive and calming atmosphere.
- Add an artistic impression of the uniqueness of the city from different types of plant vegetation to add variety of crop values so it will look more beautiful and give a relaxed impression for everyone who sees it.
- Does not require extensive land applications. It can be done with potluck wall without having to use the land and wide space.

There are 2 types of Smart Vertical Park, green facade and living wall. Green facade is a wall that is covered directly by plants that propagate on the wall. While the living wall is a wall that still needs media / place of living plants such as bricks, pipes, shelves, panels, pouches, small pots, wire, etc. and they are arranged vertically. The medium grows as substitutes for commonly used land are cocopeat, husk, pumice, perlite, seaweed and many more (Figure 2).

![Figure 2. System Panel](image)

Like plants in general, plants in SVG also need sunlight, air, fertilizers, and other minerals to continue to grow and multiply. Sunlight can be absorbed directly by plants about 10,000 lux, so the plants can grow better. If SVG is not too high or about 2.5 meters, then watering 2-5 liters / m² can be done manually and vice versa, if SVG is too high then irrigation system can be done by using automatic irrigation circulation. Some of the materials for the installment are light iron frame, polycarbonate, geotextile or glasswoll, irrigation drip and plants (Figure 3).

![Figure 3. Vertical Garden.](image)
The most important thing to maintain the vertical garden is watering. It can be manually or use a fertilizer sprayer (sprayer) using the self-timer automatically. Treatment is done regularly and intensively such as spraying pesticides and herbicides against pests and weeds that are likely to attack the plant and clean the leaves that are old and damaged.

4. Conclusions
Finally, the implementation of Smart Vertical Garden showed that Vertical Garden is very effective to be applied on the exterior on the walls of Bandung city building. There are a lot of benefits in applying this vertical garden such as applicable on the limited space, clean the air, prevent the noise, and as a bonus it is very pleasing to see such a beautiful pattern of plants hanging on the exterior of our building exterior. Beside of that, vertical gardening is also easier to be applied in the city than the conventional gardening because of the limited space needed. This Smart Vertical Garden application also supports the successful implementation of clean, green, beautiful, healthy city of Bandung and obtains a conducive, safe and comfortable environment.

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