

## **The implementation of Passive Cooling in Malaysia: the studies on the developers point of views**

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## Abstract

*Passive cooling is one of the technologies or designs to cool a building without the electricity and it saves more energy. This technology has grown along with the changes in society that emphasizes sustainability and environmental stewardship. Passive cooling technology system is a new technology that is brought in line with the concept of sustainability and its demand are constantly rising. However, the increased usage rate of this technology is still small compared to other developing countries such Malaysia. These problems can be identified in various stages of a construction process especially in construction costs and investment. The construction stage also faces problems in the installation of all passive cooling system and which is influenced by the environment in the context of consciousness. This study reveals that initial cost and knowledge of the systems are the hindrance.*

## 1. Introduction

Weather is the most important aspect of nature. Without it, people will not be able to live as we rely on the weather for daily activities. There are many types of weather conditions that such as the rainy season, hot, cold and others. Malaysia experience hot humid weather throughout the country that received direct sunlight and rainfall every year. This type of weather has influenced the lifestyle of the Malaysian. As mentioned earlier, the weather greatly affects human life, including building construction sector.

Hot-humid weather is very influential to human life. In context of construction, it influences the design and system for building construction. In order to cater with the hot humid weather in this country, the designer, especially architect and engineer are required to design a proper cooling system to provide suitable condition in the building [1]. The cooling system is very important in a building because it affects the comfort zone of a building. If a building does not have a good cooling system, the occupants will not feel comfortable to reside in the building [2].

There are two types of cooling technology that are used in order to achieve optimal thermal comfort in the building which are the active cooling system and the passive cooling system [3]. Active cooling system is the system that uses energy like electrical energy to decrease the temperature and release heat from the building. The passive cooling technology uses less or does not consume any energy at all. It controls the environmental and internal loads for maintaining indoor thermal environment within comfort range [4].

Passive cooling is one of the methods to reduce energy consumption which also assist in reducing

environmental pollution. Many people prefer more sustainable concept such as the passive cooling [5]. Technology can reduce electricity consumption in time to be long even though the initial cost is higher. However, the increased usage of this technology is very low compared to other developing countries. This study will examine the barriers in using passive cooling [6].

## 2. Methodology

In order to get the information, a survey was made to construction companies that are highly influenced in the construction sectors. Questionnaires were distributed to 12 respondents for each party which consists of developers, architects, engineers, contractor and suppliers around Penang and Kuala Lumpur. It is due to the rapid development within these areas and many samples can be used as references.

## 3. Results and discussions

After analysing the questionnaires, the student found there are many obstacles in the use of passive cooling. Responses given by the respondents are based on different types of jobs, education level and the experiences in construction industry. Hence, many of the opinions are varied in nature.

### 3.1. Cost

Cost is one reason for the passive cooling system utilisation rate is still low in Malaysia. In certain circumstances, the cost for the building that uses passive cooling system is almost 30% higher than buildings without it. This has caused many of the parties involved in the construction industry ignore this concept. There are many reasons why the price of cooler buildings us more expensive materials than ordinary buildings.

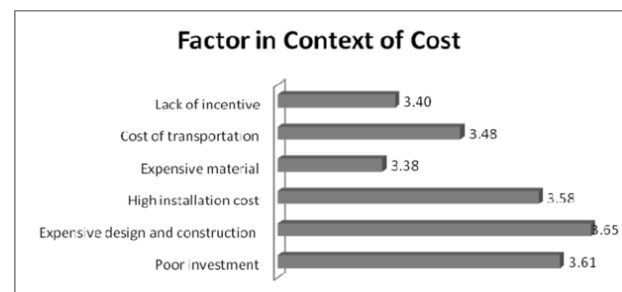


Figure 1. Factors in context of cost.

After several studies and surveys were conducted, it is found out that the cost for expensive design and construction materials is the main reason why most parties do not prefer this concept since it requires a lot of research on the building environment. Passive cooling in buildings is very expensive because it requires professional workers and materials are that are more expensive.

This statement is supported by conducted in which skilled workers and expensive building materials were ranked third and fourth. In addition, the high fees of professional workers for the installation of passive cooling also increases the construction cost of a building.

Based on the Figure 1, investments for passive cooling of buildings is the second highest obstacle in the use of passive cooling in buildings. In the construction industry, investor is the most important parties because they provide financial elements to carry out some development within the area. It makes them as the main player in certain construction industry because they practically the concept of the buildings.

Normally, certain investment must provide higher profit to the investor than the construction cost. However, investors are not confident with the profit margin if passive cooling system were to be installed in a building. Therefore, they would not dare to take the risk in investing for buildings equipped with passing cooling system.

### 3.2. Knowledge

Proper set of knowledge is vital since a system cannot be implemented such as the use of passive cooling in buildings without certain skills and knowledge. As we know, the usage rate of passive cooling in the construction sector in Malaysia is still comparatively low. It is due to the lack of exposure regarding this system.

#### 1. Lack of expertise

Construction and design of buildings for experienced employees in the area is vital. In the context of employees' expertise (Figure 2), mainly in construction domain, the number of experts is low and causing them very high cost. This has contributed to the reduction of passive cooling implementation.

According to a survey made of, shortage of specialist workers in the industrial sector is due to companies which do not send employees to have proper training courses for skills improvement of employee. This is because of the high cost requires to send employees for training courses.

Moreover, this problem is also due to the influx of foreign workers in the construction sector. They do not know about the installation and construction of passive cooling without proper training. Lack of training courses on passive cooling also contributed to the lack of skilled workers that knows on how to install. This will cause them to appoint experts from overseas' companies which will generate higher cost.

### Causes of lack of expertise

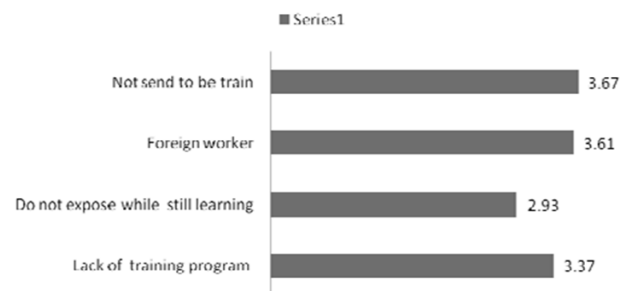


Figure 2. Cause of lack of expertise.

#### 2. Exposure on Passive Cooling Concept

Initial exposure to the concept is very important to attract interested parties. The uses of concepts are more prominent before a disclosure can be made

The study found that most respondents disagreed with the statement that they did not have time to learn the subject. This is supported by the mean index created from survey made that acquired the value of 2.93.

From the analysis in Figure 3, there is other information that is useful in conducting data analysis. In the findings, respondents with a diploma have higher rates of agreeing with the questionnaires.

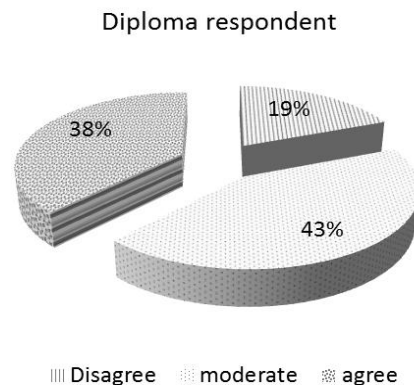


Figure 3. Diploma respondent upon exposure.

It is true since most of the respondents that has only diploma level agreed with this statement.

This is due to the certain statement that the diploma education level is not suitable to be given early exposure on passive cooling as they are considered as less competent with people of higher education level.

#### 2. Awareness

There is a wide variety of concepts that were introduced to the public to ensure the sustainability of the environment. However, the level of public awareness shown in Figure 4, Malaysia is still low for the exposure of the passive cooling and its advantages.

From the study, it is found that the level of public awareness on the importance of passive cooling and its effects on the environment is comparatively low. To ensure that the use of passive cooling, we have studied the parties responsible for introducing the passive cooling concepts and its importance in the community.

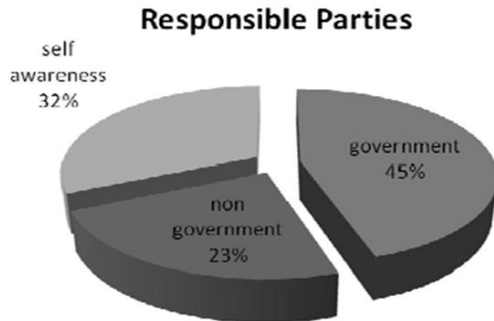


Figure 4. Responsible parties

From the data analysis, it is found out that the government plays the most important role to increase public awareness of the system. Awareness campaigns should be held by the government to ensure that the message can be conveyed to the public.

#### 4. Conclusion

Construction in Malaysia are enhance day by day. But the rate of the enhancement is still low compared to other developing countries that apply the passive cooling technology in building. There are many obstacles that have been identified after the study was conducted. Cost and knowledge of the systems are the hindrance. More study need to be done to minimize the cost and increase the level of awareness among the practitioners and the public.

#### References

List and number all bibliographical references in 9-point Times, single-spaced, at the end of your paper. When referenced in the text, enclose the citation number in square brackets, for example [1]. Where appropriate, include the name(s) of editors of referenced books.

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