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Sustainable Construction in Sultanate of Oman: Factors Effecting Materials Utilization

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Abstract

Due to rapid growth in population and economy in Oman, housing and urban expansion are considered as high priorities for development. Despite attempts for promotion of sustainable building construction in the sultanate, construction industry has not yet embraced the concept in many sectors. Sustainable construction materials, as the major component to enable the construction of sustainable buildings, have not been implemented in most construction projects in Oman. This research aimed to find the main obstacles that prevent the application of sustainable construction materials in Oman. Two main methods of research included review of literature and interviews with experts from construction industry to identify important factors. Questionnaires prepared based on the factors identified from interviews and literature review, were distributed between members of construction industry in various sectors. Results of this survey indicate that according to members of construction industry, factors that are significantly preventing the effective application of sustainable construction materials in the order of impact are: lack of demand and culture of green construction, high costs of sustainable construction materials and lack of knowledge regarding sustainable construction materials.

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1. Introduction

The continuous development in construction and neglecting the environmental needs lead to negative impact on the environment and its surrounding [1, 2]. Over the past years, a rapid development in construction sector has been observed at the Middle East region which increases the level of per capita energy consumption [3, 4]. The worldwide building construction sector consumes approximately 40% of energy produced in the world [5]. The Middle East countries produce high amount of per capita carbon dioxide emission, and even considered among the highest countries contribute to carbon dioxide emissions [6]. Sustainable buildings enhance quality of life, work productivity, and create healthy environment. Therefore, sustainable construction or green buildings has been identified as the response of the building construction sector to the challenge of sustainable development [7]. The sustainable construction commonly uses green materials, reduces energy consumption, saves water, preserves indoor air quality, and many more.

Oman is one of the Middle East countries with a middle-income economy and produces lower oil and gas than other countries of the Persian Gulf Cooperation Council with higher production cost [8]. Rapid population growth, income level, rapid development and urbanization have a direct impact on the increase of energy, water demand, and construction. The Omani construction projects have been raised by 9.4% annually between the years 2012 and 2016, and expected to expand between the years 2017 and 2021 [9]. Therefore, the government of Oman has decided to broadly practice the sustainable or green construction to mitigate the demand on energy and water needs, and to minimize the environmental impacts associated with the rapid construction and development [10]. As a part of Oman Vision 2020, the Government of Oman is investing continuously in constructing large-scale infrastructure projects [11]. Some of these projects are already undertaking sustainable building practices and using green building materials which supports the country’s growth scheme. Utilizing sustainable materials can significantly reduce the damages of construction to the environment. However, it is not only adding the green materials in building that affect the environment impacts, but the methods of building and operating with these materials have a huge impact as well. [10]

The selection of building materials is a very important and complex task in every construction project [12], which can be determined with numerous preconditions, decisions, and considerations. Therefore, detail information on building material and product must be constantly studied for the best material selection during the design phase in every construction project [13]. The use of sustainable materials in construction to replace traditional materials enhances the overall environmental sustainability and reduces the environmental impacts during the building life cycle. The use of environmentally friendly materials in building construction preserves natural resources and reduces pollution [14]. Furthermore, it offers specific benefits to the building owner and building occupants. However, many construction projects are still only applying traditional materials. The use of sustainable materials in construction encounters various obstacles [6, 15, 16, 17, 18, 19, 20, 21]. Identifying these obstacles in the Sultanate of Oman can boost the application of green buildings broadly in the country.

This paper attempts to discover these obstacles in Oman. The findings and data from existing literature, interviews and the result analysis of expert’s survey identified a generic set of factors that discourage the implementation of sustainable materials in Oman construction industry.

2. Objective

This research aimed to discover the primary factors which obstruct the utilization of sustainable construction materials in Oman.

3. Methodology

In order to accurately identify the factors which are preventing the industry to implement green construction materials, a comprehensive research method was applied.

First through in-depth review of literature, five major factors were identified. Moreover, interviews with number of experts from different sectors of construction industry were conducted to include the local professionals’ opinions and inputs. During the interviews participants were asked to state the possible reasons of deficient utilization of
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