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Saudi Building Industry's Views on Sustainability in Buildings: Questionnaire Survey

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Abstract

Sustainable buildings have an important role to play in achieving sustainable development through their improved energy and environmental performance. In Saudi Arabia, the significance of the building sector can be realised from the fact that the per capita carbon dioxide emissions, per capita electricity consumption, and number of buildings are on a steep rise due to the economic and population growth. It is therefore vital for the country to consider energy-efficient buildings in order to promote sustainable development. This article investigates the prospects of sustainable buildings in Saudi Arabia by reflecting upon the findings of a questionnaire survey conducted with pertinent professionals. The analysis in this work is based upon 122 responses received from architects, engineers, project managers, construction contractors, developer and investors. The findings of the survey indicate that the Saudi building industry has yet to realise the importance of sustainability. It is found that the level of formal education and work experience tend to have a positive influence on the appreciation of sustainable buildings.

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1. Introduction

The past two decades have seen a growing realisation that the current developmental practices are unsustainable [1]. The rising concerns about environmental issues are driving the nations across the world to adopt sustainable models of development [2]. Sustainable development is defined as a “*development that meets the needs of the*

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present generation without compromising the ability of future generations to meet their own needs" [3]. It recognises the interconnections between society, environment, and economy incorporating a holistic approach to define solutions that deliver benefits to all of these whilst minimising negative impacts [4].

The building industry has a key role to play in achieving sustainable development in any country. Buildings contribute to environmental issues ranging from the excessive use of resources during the construction and the operation stages to polluting the surrounding environment [5]. Buildings not only use resources such as energy and raw materials but they also generate waste and potentially harmful atmospheric emissions [6]. The building sector has a major role to play in tackling these issues, as it is responsible for over 40% of the world's total primary energy consumption and up to 30% of the total carbon dioxide (CO₂) emissions [7]. Moreover, buildings are responsible for a substantial proportion of the global greenhouse gases (GHGs) emissions. For instance, the US Green Building Council [8] suggests that the US commercial and residential building sector accounts for 39% of CO₂ emissions per year, more than any other sector in the country. According to Alnaser et al [9], construction and operation of buildings have an enormous direct and indirect impact on the environment. The annual environmental impact of the global building sector includes energy use (42%), atmospheric emissions (40%), raw materials use (30%), solid waste (25%), water use (25%), water effluents (20%), land use (12%), and other emissions (13%) [9]. Given the massive growth in new construction and the inefficiencies of existing building stock worldwide, in a business as usual scenario, the level of GHG emissions from buildings is set to rise in future [7]. In fact, the energy issue is a major aspect of a certain sustainable building [10]. If the desired targets for GHG emissions reduction are to be met, emissions from the building sector need to be tackled with much greater seriousness and vigour than the past efforts by promoting sustainable-energy building practices. The sustainable-energy buildings can be achieved through three main principles including energy-efficiency measures, sustainable design solutions, and renewable energy technologies [11]. This work investigates the prospects of sustainable-energy buildings in Saudi Arabia by reflecting upon the findings of a questionnaire survey conducted with pertinent professionals. This work would lead to further work in highlighting the opportunities and challenges for promoting sustainable-energy buildings in Saudi Arabia.

2. Sustainable Buildings for Saudi Arabia

During the last decades, the Saudi government has paid significant attention to sustainability and achieving sustainable development is one of the main objectives of the economic and social development plan in Saudi Arabia [12]. The United Nations Development Program [13] stated that during the eighth development plan (2006-2010), the aim was to achieve sustainable development throughout and eliminate the negative impacts on the natural resources, the quality of life and the public health, as well as protecting the environment from harmful activities or practices. Consistent with the drive to achieve sustainable development, the Ninth Development Plan (2010-2014) emphasises conservation and protection of environment from pollution, and conservation and development of wildlife, as well as conservation and rational utilisation of natural resources.

The Energy Information Agency [14] suggests that between 2006 and 2010 the per capita CO₂ emissions from the consumption of energy in Saudi Arabia are on the rise and are the highest in the world emissions as indicated in Fig. 1 (a). Furthermore, the per capita electricity consumption which is based completely on fossil fuel is also increasing rapidly due to factors like burgeoning population, urbanization, subsidized tariffs and increased use of energy intensive appliances as shown in Fig. 1 (b) [15]. Owing to these factors the electricity demand is expected to double by the year 2025 [16].

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