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Assessing of Critical Parametrs on Earth Architecture and Earth Buildings as a Vernacular and Sustainable Architecture in Various Countries

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Abstract

Earth construction has received in the last decade an increased attention by the scientific community illustrated by a tenfold increase of the published research articles when compared to the previous decade. An assessment guideline is for implementing earth architecture as sustainable and vernacular architecture for various countries such as Malaysia, Iran, USA, UK, Australia and Yemen is presented. The literature is first searched in order to investigate the earth architecture from ancient until today. This literature search forms the rationale for the relevant stages of the assessment guideline. Each stage is discussed and possible methods of application are presented.

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Keywords: Earth architecture, earth building, sustainable architecture, critical parameters, questionnaire;

1. Introduction

Sustainable architecture is a category of architecture based on localized requirements and building materials, and reflecting local traditions. Sustainable architecture behaviors evolve over time to reflect the environmental, cultural, technological, and historical context in which it exists. It has often been dismissed as crude and unrefined, but also has proponents who highlight its importance in current design. Earth architecture is a type of sustainable architecture. Earth has been a tried and tested natural construction material for thousands of years, and in combination with modern methods can be used for modern ecological buildings. For a couple of year's earth building techniques have been growing in Iran, USA and all over Europe and Middle East. The reason for this increase is the interest in ecologically friendly construction. At the same time there is both an increase of new building products and technical developments in the production of these sustainable building materials. Earth is one of the most widely

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used of all building materials used for different architectural applications such as building, hills, shaped hills, earth sheltered, terraces, garden, landscape sites and etc. In most instances the use of earth in western developed countries is confined to earth walls only but earth walls can sometimes constitute quite a small percentage of the structure of a building. In many developing countries where the properties of earth construction are more widely appreciated, earth is utilized in the construction of floors and roofs, in addition to walls. Buildings made with earth are economical, energy saving, environmentally friendly and sustainable. Earth buildings include adobe, cob, straw and rammed earth blocks and walls. Worldwide, traditional earth construction techniques are variously known as cob, rammed earth, pise de terre, adobe, clay lump, mud. The earth used in the various construction techniques may be stabilized with cement, lime or bitumen. The type of stabilizer depends upon the type of clay present in the subsoil and the desired modification of built properties. Appropriate stabilizers will normally increase the strength and therefore, often improve the durability of the fine product. This is particularly important in areas that experience particularly inclement wheatear and often allow the earth construction to acquire a greater strength more quickly. In appropriate or incorrectly stabilizers however, they can have negative effects upon the properties of an earth building. All of these methods have been use successfully according to the local conditions, customs, and materials.

In this study, the impact assessment of critical parameters on earth architecture and earth buildings as sustainable architecture can be investigated.

Aim and Objectives

The main aim of this study is to predict the impact assessment of critical parameters of different countries by earth architecture and earth buildings as a type of sustainable architecture. Critical parameters are included architectural styles, construction methods, materials, structural aspects, economic aspects, climate conditions, and new technologies such as nanotechnology in earth buildings. In order to achieve the aim of work, three objectives have been identified:

- To investigate the influence of critical parameters on earth buildings and earth architecture in Malaysia, Iran, USA, United Kingdom, Australia and Malaysia.
- To compare the influence of critical parameters on earth buildings in six countries.
- Provide a general guide for earth buildings as a type of sustainable buildings.

Scope

Impact assessment of critical parameters are included the evaluation of type of earth buildings as sustainable buildings in Malaysia, Iran, USA, UK, Australia and Yemen based on architectural styles, construction methods, materials, structural aspects, economic aspects, climate conditions, and new technologies such as nanotechnology in earth buildings. Based on different aspects of existing researches, literature review and discussion with few senior architects and researchers, the questionnaire is completed. The questionnaire is to be completed by architects, engineers, builders and contractors, and developers in six countries. The questionnaire is included based on critical parameters in earth buildings such as architectural styles, construction methods, materials, structural aspects, economic aspects, climate conditions, and new technologies such as nanotechnology in earth buildings in six countries. It would be almost impossible to get responses from people who had never even considered “earth building and earth architecture”. The questionnaires are to distribute to architects and civil engineers who are related to architecture and building materials. Since architects and civil engineers work closely with more mainstream building professionals in every day and have probably given some thought to the issue of sustainable practice barriers, it has felt that this group could provide informed speculation about what is the impact assessment of critical parameters on earth building and earth architecture in six countries. The architects and civil engineers are used from architects society and society of civil engineers in each country.