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ANALYSIS AND BEHAVIOR OF DIFFERENT MATERIALS IN SUSTAINABLE CONSTRUCTION AND THEIR ALTERNATIVES FOR THE IMPROVEMENT OF THE ENVIRONMENT

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ABSTRACT

The construction sector is widely known for its growing activity and its impact on the environment. The use of different materials within the world of construction has evolved over the years. Thus, thanks to technology, it has been possible to achieve an improvement in the behaviour of certain materials in the world of construction. In this article, different materials from this sector are analysed in order to achieve an improvement and awareness towards a more sustainable construction. The focus has been on the study of the behaviour of these materials and their responses to the phases of construction. As analysed, it has been possible to demonstrate that the controlled evolution of certain materials such as the use of clinker or cementite, significantly improves the context of sustainable construction. On the other hand, by replacing cement by other materials such as fly ash or slag can improve the durability by 50% which is a high figure related to the sustainable point of view, thus can reduce the impact on the environment.

Keywords: Sustainability, construction, ecological materials.

INTRODUCTION

Currently there are many activities that turn out to be unfavorable for the environment, however those that stand out are from the industrial sector, transport along with the construction sector (Wieser *et al*., 2021), which through several factors ends up affecting the environment in a negative way. On the other hand, it is worth mentioning the awareness of the environment in recent years, and this can be seen by increasing studies aimed exclusively at factors that affect the environment, therefore it can be said that the perception regarding traditional construction is changing towards a more ecological and sustainable future (del Río Merino *et al*., 2009). De-

spite understanding the negative effect, it is still necessary to implement measures and regulations that regulate the current system of materials management within the field of construction and demolition. The world of construction is also known for its impact on the environment both by the process of building and the materials used (Coelho and de Brito, 2012). This article analyzes the various building materials and their impact on the environment along with the study of how to improve the current system.

In the case of Spain, the field of construction and demolition is one of the economic engines (Duarte and Bielsa, 2011), it is so much that the economy of this country is linked to the trends of the construction sector, which has been verified after the crisis of 2006. The negative points related to the field of construction are due to several factors, being the most important the use of the materials used in it and the final stage of them (Sandin *et al*., 2014). This last point is mainly due to the demolition phase where the materials are deposited mostly untreated for other use. The result of the unfavorable impact of the construction sector can be seen in climate change, deforestation, loss of biodiversity ("EU Biodiversity Strategy for 2030").

These effects on the environment are mostly due to the use of materials along with the energy used in the process. In order to reduce these impacts on the environment, it is necessary to understand the concept of sustainable materials, since they are those that generate less environmental impact (Miller and Ip, 2013). Being materials, whose origin is natural, it makes them both materials with high potential to be recycled. This virtue makes its impact not as serious as traditional materials. Sustainable materials also have a low amount of energy used both in the extraction process and throughout the life of the materials (Xundi *et al*., 2010). Energy waste is found mainly in materials that are heavily handled and have little recycling potential.

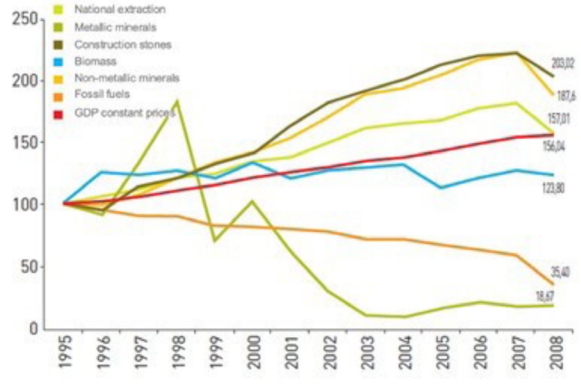

Figure 1. Evolution of National extraction and other factors represented in a period of time of 14 years. **Source**: OBSE (Spanish Observatory of Sustainability) (Miller and Ip, 2013).

CONCLUSION

The use of energy for the extraction of materials occurs in high quantities. This point makes that in some cases this type of practice manifests itself in an unsustainable way (Xundi *et al*., 2010). In the case of Spain, it has been possible to see the evolution of the extraction of materials through the Observatory of Sustainability of Spain (Miller and Ip, 2013).

Sustainable constructions are analyzed in order to mitigate the environmental impacts that take place in cities with greater economic and social growth. Along with these growths, it is also worth noting the increase in pollution by air pollutants and the degradation of the ozone layer along with other impacts described in this article. Then the study of the materials is also carried out in order to be able to know the opportunities in the current system of construction and demolition waste management, in addition to promoting and reinforcing the use of green or sustainable materials to encourage the use of these in current and future constructions. Thus, this article analyzes the most appropriate materials to create a sustainable cycle within the field of construction, therefore it begins by describing the chosen materials and then analyze the behaviors of these materials. Factors such as different types of materials along with their impact on the environment have been considered for the analysis. With the study of these factors, results are reached where the sustainable side of each material and influence on the sustainable cycle are also shown.

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