EXECUTIVE SUMMARY

In recent decades, the relationship between humankind and the environment has grown stronger. Indeed, over time the concern and active participation of citizens in ecological and environmental issues is becoming more frequent worldwide, and more recently the link from those issues to social and economic issues is leading to a new paradigm called sustainability.

Accordingly, through this doctoral thesis the origin, evolution, and feasibility to operativize sustainability in the construction sector is studied.

The meaning of sustainability is different among the earth’s nations; nevertheless, there are some important common themes such as a concern for the environment and its resource limits and sink limits, and a concern for both inter and intrageneration equity. Thus, those common aspects had brought about that most sustainability definitions appeal to the goodwill so sufficient resources for future generations be left, in order for they having a quality of life similar to ours.

In this academic work the criteria from the main United Nations documents about sustainability has been adopted. A benchmark may thus be established by setting out the sustainability principles in order to approach them to the construction sector, dealing with new buildings specifically.

To approach sustainability principles for the construction sector, conceptualization and pragmatic (quite different) aspects must to be addressed in order to join them in a common task, taking into account the number of theoretical and empirical themes to deal with. The research and the thesis writing were organized on five linked parts, which make up thirteen chapters.
The first part (chapters I, II, and III) is the core of the thesis, because the methodology and the bottom line are set out in those chapters, and also because the origin, evolution, and the sustainable development debate are exposed.

The second part (chapters IV and V) relates to the technical items for sustainability such as Thermodynamics, the entropy law and the environment; and then these concepts and their relationship with energy and matter. It is to be stressed that these last items are the main raw materials for the construction sector.

This second part also contains tools and techniques to support sustainability, e.g. life-cycle assessment, multiattribute decision analysis, the environmental impact assessment, sustainability indicators, ISO 14000 standards, and life-cycle costs for building materials.

The previous parts provide enough knowledge and information for conducting a proposal to a more socially responsible construction sector through, the so called, sustainable construction. That is the core subject of the thesis, for which in the third part (chapters VI, VII, VIII and IX) the fundamental premises for sustainable construction are established, those premises stress the adverse environmental impacts from buildings to be tackled by sustainability principles related to resources conservation, minimizing waste through re-use and recycling materials, construction quality, nature protection, and indoor air quality.

The approach of sustainability to the construction sector is proposed from the planning, design, construction, maintenance, and deconstruction building phases. Selection of building materials, life-cycle of materials, and major environmental impacts as a result of buildings are highlighted in that third part.

The sustainable aspiration requires a benchmark in order to set out the measures to be taken in approaching sustainability. To support that process, the fourth part (chapters X, XI and XII) is orientated to support sustainability, even
though that concept is not something that can be gauged in most cases, and whenever possible not necessarily would it be in a quantitative way.

To carry out such assessment, a real region and building case study were chosen. Then, a set of sustainability indicators was developed and the building materials selection in the sustainability framework were made. That building material selection was done through an quasi-sustainable assessment method in order to assist the building designer who must be a sustainable aware designer.

The main outcome of the thesis are contained within the fifth part, and include findings, conclusions, recommendations, and an epilogue. That part also contains a proposal for synergy among some sectors of the society in order to attain some sustainable goals, mainly related to the construction sector.

Assuming that sustainability is more than just an act but a process, the main outcome from the thesis set out the benchmark for other studies and projects for the formulation of actions in achieving a transition to a desirable, feasible, and sustainable future.