THE SUSTAINABILITY OF RESIDENTIAL BUILDINGS

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Sustainable development refers to economic development that is planned and implemented taking into account the protection of the environment and its sustainability. In order to have sustainability, the exploitation of natural resources must be done at a rate lower than the rate at which they are renewed, otherwise environmental degradation takes place. The long-term result of environmental degradation is the inability of the Earth's ecosystem to support human life.

This article refers to the sustainability of residential development, which concerns the housing of a country's population and constitutes a large part of a country's economy. The useful life of a residential structure is related to how sustainable the structure is. The question that arises is how sustainable are the residential constructions in Cyprus? A study and comparison with other European countries can be enlightening.

The period of useful life of a residential construction depends on various factors such as the endurance of the construction materials, the architectural arrangement of the interior spaces and the exterior appearance of the building. A classic house design, not only lasts longer but also increases in value with time. A modern design may be considered attractive initially, but the acceptance of the style is usually transitory and the building loses value over time. A tour of the centre of a city such as Nicosia within the walls, gives the opportunity to compare the value of the older structures in relation to the newer ones that have replaced them. It is the old buildings that deserve preservation, not the newer ones.

The old between the new, in Nicosia within the walls

In the UK, residential areas expand horizontally around city centres. Classical architecture is defined by periods of rule such as Georgian (1714 and 1830),

Victorian (1837–1901) and Edwardian (1901–1910). Residential units are generally categorised into detached, semi-detached and terraced. The height varies from two to four floors. Today, residential units over a hundred years old are being renovated internally and sold with certificates of structural adequacy for use in the next several decades. The classic design and the structural strength of the construction are the two factors affecting long life. The materials used in these classical constructions were the small exterior bricks without renderings and hard wood of good quality. Even the foundations were made of the same brick, while later (1877) a concrete footing was used under the walls. Of course, we should mention here that the UK is not affected by major earthquakes. However, high moisture level in the soil has been dealt with successfully.

Edwardian semidetached house

In Cyprus, unfortunately, we do not have a classic housing design which can last architecturally and structurally for more than a hundred years. Regarding the construction materials, the buildings that have lasted over a century are those that are stone built. Examples are the Phaneromeni school for girls (Founded in 1857), the Archaeological Museum of Cyprus (1908), old schools and churches. However, the use of stone was was an expensive solution. Most residential buildings of the pre-independence era were mud brick buildings which proved to be unsustainable.

The materials used today in Cyprus are mostly concrete and, to a much lesser extent, metal and wood. The production and use of concrete and steel, are processes that are very harmful for the environment. These two materials burden the environment with large emissions of harmful greenhouse gases. Concrete is difficult to recycle since in order to do so it must be crushed to separate the metal it contains. In addition, a concrete building is very difficult to demolish. Regarding the issue of demolition, some countries require a demolition method statement to be submitted for a building permit to be issued. The problem of demolition was seen in the recent past in Nicosia near the Lycavitos Police Station, when Spyros Kyprianou Avenue had to be closed for many days.

As a result of the fact that buildings in Cyprus end up unsuitable for use in fifty to seventy years, many urban areas contain a large number of buildings that remain uninhabited for many years. The solution is usually to replace them with apartment buildings. The apartment buildings, however, also prove to be

unsustainable. In the United Kingdom the high-rise experiment was discontinued and abandoned because it created major social problems. In Cyprus, until recently, the height of apartment buildings was limited to four to six floors. Over the years, however, these constructions lose their value since they no longer attract new tenants. Renovating these buildings proves to be problematic since it costs a lot without adding enough to the value of the building.

Concrete has certain advantages, such as the feeling it gives of a solid and permanent structure that also resists fire. However it also has multiple problems. In addition to those of problematic demolition and difficult recycling, many factors affect the ultimate strength of the material. The quality of the constituent materials, the temperature and time it takes to transport the concrete from the factory to the point of casting, and the percentage water content affect the final strength of the material. Concrete is not a waterproof material. It needs waterproofing which, if not properly maintained, allows water to seep in and be absorbed. Moisture, when allowed to reach the steel reinforcement, can significantly affect the strength of the building, as confirmed by the occasional collapses of apartment building balconies.

It is never too late to take corrective action. Architects, Engineers and university researchers should work to find the right classical design, the right choice of materials, ways to reduce the self weight of the construction and develop new environmentally friendly construction materials to make residential buildings attractive and to maximise their viability.

Construction details of residential buildings in the UK: Evolution of Building Elements (uwe.ac.uk)