LIFE CYCLE COST ANALYSIS OF SCHOOL BUILDINGS: CONSTRUCTION AND REHABILITATION COSTS

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ABSTRACT

The present document demonstrates the applicability of a Model for Data Collection (MDC) throughout the life cycle of building projects in accordance with the requirements of recent European standards (EN 15643-4 and EN 16627). A case study of school buildings is selected and the historical data related to construction and rehabilitation phases of its life cycle is collected using the requirements of MDC. An analysis of this economic information is carried out, which allows validating the pertinence of the use of MDC for buildings life cycle economic assessments.

Keywords: life cycle cost analysis, school buildings, construction, rehabilitation.

INTRODUCTION

A model for economic data collection through the buildings life cycle (MDC) in accordance with recent European standards was developed (Almeida, 2016). The case study selected consists in a set of 6 Portuguese school buildings (named E1 to E6) with a construction date into the period 1936-1968. The rehabilitation year for all case studies is 2009. The rehabilitation involved the refurbishment of existing buildings, the construction of new buildings and the rearrangement of surrounding areas.

According to the information required in MDC, for the construction phase, the following scope of costs are collected: general construction/installation process (A5); transports into the construction site (A5.9); products and materials installation (A5.10); construction supervision (A5.16); and professional fees (A5.17). For the rehabilitation phase, the following scope of costs are collected: planned adaptations and refurbishment (B5.2); waste management (B5.3); enlargement (B5.6); and landscaping (B5.7) (Almeida, 2016).

The comparison between costs occurred in different years requires the application of a discount rate. Net Present Cost (NPC) is used and represents the sum of the discounted future cash flows. NPV is a standard measure in LCC analysis, used to determine and compare the costs effectiveness of proposed options. In the present case study, the cash flows occurred at different time periods are converted to a common time reference (2016). EN 16627 indicates that, for the purposes of comparability, the NPC should be undertaken with a real discount rate of 3% per year.

RESULTS AND CONCLUSIONS

Figure 1 shows the results (in percentages) of the collected costs for the construction (A) and rehabilitation (B) stages.
Figure 2 shows the dispersion, in percentages, of the total cost of construction over the years.

The MDC application is transversal to all buildings and intends to be a tool in the decision process at any stage of the building life cycle. Its implementation can begin at any stage, allowing a global view of the costs involved in a building. The correct completion of the model and estimation of future costs, ensure that decisions are more informed, economic, sustainable and reliable.

REFERENCES

