

IMPROVING THE ECONOMIC PERFORMANCE OF THE BUILDINGS LIFE CYCLE

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ABSTRACT

The background knowledge about Life Cycle Cost (LCC) and Facility Management (FM) supports the design and development of a comprehensive LCC-based methodology towards the systematic and continuous improvement of the economic performance of buildings throughout its life cycle. It also frames it into a Plan-Do-Check-Act management cycle. It highlights and covers the most important and critical building project management activities throughout sustainability. It also provides a framework for widespread LCC application in the Architectural, Engineering and Construction (AEC) sector and decision-making tools in FM, by enabling a standardized taxonomy for economic data collection during the sustainability life cycle of building projects.

Keywords: life cycle cost, facility management, buildings, economic performance.

INTRODUCTION

Over their life cycle, constructed assets demand for a considerable amount of resources and trigger transformations with important economic consequences. The economic performance of buildings may be assessed at an early stage along with the decision to build or at any point afterwards. Information is needed to support these assessments.

The LCC approach became popular in the 70s and since then it has been influencing the AEC sector. Its development involved gradual changes (Goh & Sun, 2016). Recently, the European Directive 2014/24/EU and several standards (ISO 15686-5, EN 15643-4) establish the foundations for enhancing LCC applications. On the other hand, in the last decades, several scientific studies related to FM activities have been published (Nor, et al., 2014). More recently, international standards dealing with FM activities are being developed (ISO 41000 series) or have already been published (EN 15221). These standards embrace a wide range of topics, including processes, activities and data collection.

The proposed methodology frames within the management principles of the Plan-Do-Check-Act (PDCA) cycle. The strategy of using the PDCA cycle for designing the proposed model, using *LCC assessments* as a focal point, ensures that the resulting output is robust and comprehensive and that it adheres to principles such as consistency, generality, simplicity, correspondence with existing initiatives and adaptability (Almeida et al., 2015).

A discussion on the linkage between LCC and FM is provided, highlighting the benefits in terms of information exchange for the various stakeholders along all phases of the building life cycle.

RESULTS AND CONCLUSIONS

The background knowledge of the proposed LCC-based methodology ranges from scientific papers, reports, guides and other items published within both regulatory and non-regulatory environments. It can be categorized into three levels of contribution (H - higher, M - medium and, L- lower), as shown in Table 1.

Table 1 - Background knowledge contributions levels

	LCC	LCC	LCC	LCC	FM	FM
	Scientific papers	Other Publications	Regulatory environment	Non- Regulatory environment	Scientific papers	Non- Regulatory environment
Plan LCC assessment	L	M	H	H	L	M
Do LCC assessment	L	L	-	-	L	-
Check LCC assessment	M	L	-	M	L	M
Act LCC assessment	M	L	-	-	H	-

The *Plan of LCC assessments*, have been sufficiently addressed by both regulatory and non-regulatory environments. However, the existing background knowledge shows that the actual *Do LCC assessments* and the applicability of LCC and FM standards such as ISO 15686-5, ISO 41000, EN 15221 and EN 15643-4 still needs to be clearly tested (*Check and Act LCC assessment*).

The main goal of this methodology is to improve the economic performance of buildings while addressing the recent challenges imposed by regulations such as the European Directive 2014/24/EU. It can be used by several stakeholders, in AEC sector, throughout all phases of buildings life cycle, such as engineers, architects, facilities managers, facilities owners, regulators and authorities, banks and insurance companies and end-users.

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