

A Standard Need

Personal Property Life Cycle Costs, A Standard

What's the big deal about life cycle cost? Why do we need a standard? And more importantly, what is a life cycle cost? The last time you purchased a major appliance such as a water heater or a refrigerator, did you examine the "Energy Consumption" sticker on it to get an idea how much this new appliance might cost on an annual basis? If so, you were considering portions of the life cycle cost of that item. The last time you were at a car dealership, did you notice the estimated annual fuel costs as well as the manufacturer's suggested retail price? If so, you were considering portions of the life cycle cost of that automobile.

LIFE CYCLE DEFINITIONS

Life cycle cost (LCC) is a much bandied about term. It is the subject of great research and more than a little vigorous discussion. Type "life cycle cost" into your favorite Internet search engine, and you will be rewarded with, literally, hundreds of thousands of responses.

ASTM International already has a standard for the life cycle cost of buildings. (ASTM International is an open forum for the development of high-quality, market-related international standards used worldwide.) And a relatively recent executive order established a Federal Real Property Council and senior real property officers for federal agencies. One of the chief considerations for the senior real property officers and the council is, "life cycle cost estimations associated with the agency's prioritized actions."

It is difficult to find an agreed upon definition of life cycle cost, and variations of the phrase are everywhere. Webster's Online Dictionary defines LCC as, "the sum of all the costs both recurring and nonrecurring, related to a product, structure, system, or service during its life span or specified time period." Meanwhile, the Office of Government Compliance (OGC) United Kingdom's Successful Delivery Kit Web site explains, "Life Cycle Costing (LCC) also called Whole Life Costing is a technique to establish the total cost of ownership. It is a structured approach that addresses all the elements of this cost and can be used to produce a spend profile of the product or service over its anticipated life-span."

We can probably agree that life cycle costing is more or less equal to life cycle cost analysis. However, we still haven't defined LCC. Your author defines LCC as the sum of all costs associated with an item or group of items. These costs include not only the acquisition value, but also all activities related to an item, from acquisition through utilization and disposition.

A TCO COMPARISON

LCC is often used interchangeably with the phrase total cost of ownership (TCO). The Gartner Group, credited with coining

the term, defines TCO as "a fundamental decision support tool that presents a holistic view of costs across the enterprise, over time. It includes the people and process costs, in addition to the technology costs."

It is interesting to note that the vast majority of Internet references to TCO involve IT assets. Thus, it certainly seems as if the IT establishment has bought into the concept.

The U.S. Department of Defense, a significant purchaser of goods and services, attempts to explain the meaning of the similar terms in the Defense Acquisition Handbook: "The terms are similar in concept, but significantly different in scope and intent. For a defense acquisition program, Lifecycle cost consists of research and development costs, investment costs, operating

LCC is important because the acquisition value of an item plays only a small part in relation to the true costs associated with owning and operating that item.

and support costs, and disposal costs over the entire Lifecycle. These costs include not only the direct costs of the acquisition program, but also include indirect costs that would be logically attributed to the program. The concept of total ownership cost is related, but broader in scope. Total ownership cost consists of the elements of Lifecycle cost, as well as other infrastructure or business process costs not necessarily attributable to the program. Subsequent sections more carefully define and describe these concepts."

LCC is at least roughly analogous to TCO, but to avoid confusion, let's use LCC throughout this article.

UNDERSTANDING LCC

So what is the big deal about life cycle costs? LCC is important because the acquisition value of an item plays only a small part in relation to the true costs associated with owning and operating that item.

Stated another way on the Successful Delivery Kit Web site, "The cost of ownership of an asset or service is incurred throughout its whole life and does not all occur at the point of acquisition." The site continues, "There are 4 major benefits of LCC analysis: evaluation of competing options in purchasing, improved awareness of total costs, more accurate forecasting of cost profiles and performance trade-off against cost."

Here is an example to clarify this point: According to a University of Michigan study, a 1991 Ford Escort Wagon is listed at a manufacturer's suggested retail price of \$7,994.90.

This study found that at the optimal replacement interval of 17 years, there was a total cost of more than \$47,000, almost six times the acquisition value.

Why would someone spend \$47,000 on an \$8,000 vehicle? Hopefully, the vehicle provides some sort of value justifying the expenditure. Perhaps the vehicle transports the owner to a job where money is earned. Or the owner may transport goods from point A to point B for some sort of consideration. In either case, the owner feels justified in the investment of much more than the acquisition value over the life of the vehicle, hoping that the vehicle will provide reliable transportation for several years.

This simple example demonstrates two very important, distinctly separate yet closely related concepts: purchase price vs. life cycle costs. These two concepts are usually depicted on two widely used and accepted documents that define the overall financial health of an organization, namely the balance sheet and the income statement (or profit-and-loss statement.)

For-profit organizations show the acquisition value of capital items on the balance sheet under the “assets” heading, and costs related to acquiring, using, maintaining and disposing of those assets are buried under the heading “operating costs” on the income statement. However, the relationship between assets and operating costs is little understood, seldom researched and almost totally ignored in the search for increased efficiency and profitability.

Consider the purpose statement in the ASTM Standard Practice for Measuring Life-Cycle Costs of Buildings and Building Systems: “The basic premise of the LCC method is that to an investor or decision maker all costs arising from an investment decision are potentially important to that decision, including future as well as present costs. Applied to buildings or building systems, the LCC encompasses all relevant costs over a designated study period, including the costs of designing, purchasing/leasing, constructing/installing, operating, maintaining, repairing, replacing, and disposing of a particular building design or system.”

It’s a very small leap of imagination to envision the horror stories that in all likelihood led to the development of this standard.

WHY DO WE NEED A STANDARD?

A simple Internet search will quickly establish the fact that there are formulas for calculating the LCC of many, many things, including but not limited to: buildings and building systems; pumps (usually closely related to buildings and building systems); pavement, trucks, lights and other traffic-related items; newspaper production systems; rotary aircraft; and, especially, information technology assets.

There are legions of dot-coms ready, willing and able to sell software or services in support of establishing LCC. We have already established that there is an existing standard for buildings and building systems. Yet there is no standard concerning the life cycle cost of personal property. And upon what do we property professionals spend the vast majority of our time and efforts?

Now, what does a personal property life cycle cost standard look like? It would very probably be similar to buildings and building systems standard in that it would:

- Recommend procedures
- Identify and give examples of objectives, alternatives and

constraints

- Identify project data and general assumptions needed
- Present alternative approaches for computing LCCs

Without getting into the procedures, objectives and general assumptions, let’s jump to the fun part—alternative approaches for computing LCCs.

As noted earlier, there are many formulas available to compute LCC. Probably the simplest, for a building, seen to date comes from the State of Minnesota:

$$LCC = \text{first cost} + \text{maintenance and repair} + \text{energy} + \text{water} + \text{replacement} - \text{salvage value.}$$

Here is an LCC formula for photovoltaic systems that comes from Sandia National Laboratories:

$$LCC = C + Mp_w + E p_w + R p_w - S p_w.$$

Where the *p_w* subscript indicates the present worth of each factor. The capital cost (*C*) of a project includes the initial capital expense for equipment, the system design, engineering and installation. Maintenance (*M*) is the sum of all yearly scheduled operation and maintenance (*O&M*) costs. The energy cost (*E*) of a system is the sum of the yearly fuel cost. Replacement cost (*R*) is the sum of all repair and equipment replacement cost anticipated over the life of the system. The salvage value (*S*) of a system is its net worth in the final year of the life-cycle period.

Here is an LCC formula for refrigeration systems from a master’s thesis presented to the Royal Institute of Technology in Stockholm, Sweden by Yang You:

$$LCC = I + E + Med + OM\&R + Repl - Res + Ins + Env$$

In the above equation LCC is the total LCC in present value of kronor of a given alternative. *I* is the present value of investment costs. *E* is the present value of energy costs. *Med* is the present present value of capital costs for the media in use. *OM&R* is the present value of non-fuel operating, maintenance and repair costs. *Repl* is the present value of capital replacement costs. *Res* is the residual value. *Ins* is the present value of insurance costs. And, *Env* is the present value of capital environmental costs (due to emissions).

You can now see these three examples have a lot in common. More importantly, you can understand there is a lot more monetary commitment to any one item or group of items than that data normally recorded in our property control systems under acquisition cost.

This life cycle cost concept truly links the assets on the balance sheet to the operating costs on the income statement.

Lyle Hestermann has 23 years in the property profession, 32 years in the Army and Air National Guard, is the NPMA Foundation Administrator and the vice chair of ASTM Committee E53 on Property Management Systems.

Reprinted with permission from Property Professional, vol. 17, issue. 3.