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Standard Practice for Determining the Life-Cycle Cost of Ownership of Personal Property[1]

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INTRODUCTION

Historically, the financial and property management communities have considered the "cost" of an item or group of items to be the acquisition value of the item(s), that is, the value/cost of an item is generally based upon the amount of money paid for the item, irrespective of the many and varied costs associated with the full life cycle. There are more appropriate models than the historical model for valuing property. However, for the purpose of this practice on life-cycle costing (LCC), one should consider that in addition to the initial procurement costs, there are myriad costs required to support, maintain, operate, and dispose of the item(s). This practice on LCC provides an accepted methodology for calculating and summing those costs and provides a true total cost of ownership that helps management make more informed and better acquisitions decisions.

1. Scope

1.1 This practice covers the establishment of a process consensus model for determining the life-cycle cost (LCC) of personal property assets owned or used by an entity.

1.1.1 For businesses, these personal property assets are required to achieve financial returns from producing and selling goods or services, or both.

1.1.2 For institutions and agencies, these personal property assets are required to accomplish their primary mission.

1.2 Real and personal property assets may include capital (fixed) assets and movable, durable assets including: customer-supplied assets, rental/leased assets, contract/project direct-purchased assets, or expense items.

1.3 Asset service lives can be divided into three distinct stages, each with several separate yet interrelated substages: acquisition, utilization, and disposition. These primary stages are not intended to be all encompassing, but are offered as the basis for establishing LCC.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E2135 Terminology for Property and Asset Management

E2279 Practice for Establishing the Guiding Principles of Property Management

3. Terminology

3.1 *Definitions:*

3.1.1 *calibration, n*—act of standardizing or determining the deviation from a standard so as to ascertain the proper correction factors.

3.1.2 *life-cycle cost (LCC), n*—sum of all known material costs associated with an item or group of items and these costs include not only the acquisition value, but also activities related to an item from acquisition through utilization and disposition. Sometimes referred to as TCO (see 3.1.6).

3.1.3 *personal property, n*—tangible property other than land;[3] in law, the tangible, movable property of an individual, exclusive of land and including items such as automotive vehicles, boats, and money.

3.1.3.1 *Discussion*—Software (intellectual property) is considered personal property.

[1] This practice is under the jurisdiction of ASTM Committee E53 on Asset Management and is the direct responsibility of Subcommittee E53.03 on Financial Management.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Definition from *Encarta World English Dictionary* (North American Edition), Microsoft Corp., 2004.

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3.1.4 *preventative maintenance, n*—regularly scheduled periodic maintenance activities on selected equipment that typically includes inspection, lubrication, and minor adjustment.

3.1.5 *property, n*—something or a number of things in which one has the rights and interests subject to ownership including both tangible and intangible property (see Terminology E2135).

3.1.5.1 *Discussion*—For the purposes of this practice, property includes, but is not limited to, capital (fixed) assets, customer-supplied assets, rental/leased assets, contract/project direct-purchased assets, or expense items. Generally, property does not include finished goods, products, or services marketed or sold or intangible property (such as intellectual property, patents, and so forth).

3.1.6 *total cost of ownership (TCO), n*—analogous to LCC; for clarity and consistency, this practice will use LCC exclusively.

4. Summary of Practice

4.1 For decision making purposes this practice provides for complete accountability and financial control of personal property by separating the three major life-cycle stages into more comprehensive substages and then associating those stages and substages with the effort and costs.

4.2 Entities adhering to this practice will establish a demonstrable and consistent methodology to ascertain the LCC for individual assets or groups of assets. Elements of the methodology will consider, at a minimum, those factors described in this practice.

4.3 The costs, now identified, can be tracked and analyzed, leading to a more comprehensive understanding of how assets can be more effectively and efficiently used, especially from a cost standpoint.

5. Significance and Use

5.1 For agencies and institutions, measuring and managing the LCC of ownership of property may directly result in improved accountability, in the form of cost savings, increased asset utilization, extended asset life, and increased mission effectiveness.

5.2 For companies, measuring and managing the LCC of ownership of property may directly result in cost savings, increased asset utilization, and, therefore, improved profit margins.

5.3 Including LCC in the three stages is consistent with Practice E2279 under the reporting principle.

6. Associated Costs

6.1 Associated costs can be broken down into three distinct stages:

6.1.1 *Acquisition*—Budgetary/planning–concept, feasibility, studies, funding, lease/buy, make/buy, and so forth and site acquisition, construction, design, purchase, receipt, and so forth;

6.1.2 *Utilization*—Skills, training required and knowledge of the user, utilities; recurring and preventive maintenance; rehabilitation/overhaul; calibration; environmental, health, and safety (EHS) compliance; American with Disabilities Act (ADA) compliance; and so forth; and

6.1.3 *Disposition*—Identification of idle or excess items or both, disposition determinations, actual disposal costs, and so forth.

6.2 *Assets*—The three major stages in the life of an asset or group of assets are further detailed (this is not intended to be an all-inclusive listing):

6.2.1 *Acquisition:*

6.2.1.1 Budgetary/Planning,

6.2.1.2 Need and schedule identified,

6.2.1.3 Concept planning,

6.2.1.4 Alternative considered,

6.2.1.5 Resolution,

6.2.1.6 Funding approved,

6.2.1.7 Detailed design developed,

6.2.1.8 Purchase,

6.2.1.9 Receive,

6.2.1.10 Identify, and

6.2.1.11 Record.

6.2.2 *Utilization:*

6.2.2.1 Set up integration as necessary and function check,

6.2.2.2 Training operators,

6.2.2.3 Maintenance, and metrology (calibration), and rehabilitation,

6.2.2.4 Movement and storage,

6.2.2.5 Physical inventories,

6.2.2.6 Reports,

6.2.2.7 Subcontractor control (for those assets at vendors), and

6.2.2.8 Labor cost for operation.

6.2.3 *Disposition:*

6.2.3.1 Disclosure as excess,

6.2.3.2 Approval/authority to dispose,

6.2.3.3 Disposition determination,

6.2.3.4 Costs incurred for disposal, and value received,

6.2.3.5 Recognition of retirement with records adjustment.

6.3 *Contributors*—Major contributors to the LCC process include, but are not limited to:

6.3.1 Planning may be accomplished by the intended user with, possibly, the assistance of:

6.3.1.1 Procurement/supply chain management for vendor/cost advice,

6.3.1.2 Metrology for support/maintainability advice,

6.3.1.3 Facilities for utilities and space requirements advice, and

6.3.1.4 Accounting for budgetary advice.

6.3.2 Acquisition is usually performed by:

6.3.2.1 *Procurement/supply chain*—Purchase components,

6.3.2.2 *Receiving*—Receive components,

6.3.2.3 *Test equipment*—Assemble components, and test the station,

6.3.2.4 *User*—Take custody, train on use, and use,

6.3.2.5 *Metrology/administrative*—Establish records and preventive maintenance (PM) or calibration (CAL) requirements or both, and

6.3.2.6 *Accounting*—Accounts Payable and Fixed Asset Accounting.

6.3.3 *Utilization:*

6.3.3.1 *User*—Verifies functionality,

6.3.3.2 *Metrology*—PM or Cal, or both,

6.3.3.3 *Administrative*—Inventories/audits/records maintenance,

6.3.3.4 *User/metrology*—Repair and rehabilitation identification (which, in effect, begins the cycle anew), and

6.3.3.5 *Accounting*—Taxes and insurance.

6.3.4 *Disposition:*

6.3.4.1 *User*—Identifies idle excess,

6.3.4.2 *Metrology*—Determine condition and screen for potential reuse,

6.3.4.3 *Administrative*—Screen for disposition authority and records maintenance, and

6.3.4.4 *Accounting*—Asset retirement costs or record disposition proceeds and records maintenance.

7. Procedure

7.1 Adherents to this practice may choose to track an individual item or a group of items or the entirety of a class of items in accordance with this practice.

7.2 Life-cycle costs should be computed, documented and considered at inception.

7.2.1 Thus, a simple LCC equation for a single item could appear as:

$$\text{LCC} = +A + U \pm D \tag{1}$$

Where:

A = acquisition,
U = utilization, and
D = disposal.

7.2.1.1 The "$\pm D$" signifies that the value of D may increase or decrease the LCC of an item dependent upon whether the entity may realize a return, such as a sale, or an expenditure, such as disposal costs for hazardous items.

7.2.2 Endless permutations exist, such as:

$$\text{LCC} = A_1 + A_2 + A_n + U_1 + U_2 + U_n + D_1 + D_2 \_ D_n \tag{2}$$

where each subscript identifies a particular functional effort such as departmental planning, accounting/finance/procurement, and so forth.

NOTE 1—It is incumbent upon the user to define the specific relationships appropriate for their situation.

7.2.3 The LCC for an item or group of items may be recalculated on a recurring basis throughout the life of an asset or group of assets based upon when conditions change. In that instance, the LCC calculation could appear as:

$$\text{LCC} = A + U \pm D \pm PV \tag{3}$$

where PV is an adjustment based upon the present value of the asset, dependent upon factors such as a tax increase, appreciation in the value of the asset, an unforeseen maintenance or repair issue, and the like.

7.2.3.1 Again, it is imperative that the using entity defines the specific relationships appropriate to their situation.

7.2.4 The LCC for a large group of items may be calculated in a similar manner by summing the costs of those functional areas/departments involved in the life cycle of the items. For example, an annual snapshot of life-cycle costs of all the assets could appear as:

$$\text{LCC} = A + U + D \pm PV \tag{4}$$

Where:

LCC = all assets, real and personal, acquired, used, and disposed of by the entity during the applicable year;
A = resources allocated to procurement functions such as departmental planning and budgeting, supply chain efforts, and so forth; and
resources allocated to acquisition functions such as departmental planning, supply chain efforts, receiving efforts, labeling, and recording efforts;
U = resources allocated to using the assets, such as training, metrology, property, facilities, and manufacturing/engineering;
D = resources allocated to disposing of assets no longer required, such as property, supply chain, environmental, health and safety, ship/pack, and so forth; and
PV = factors influencing the present value of the assets, such as fair value, net book value, and so forth.

8. Keywords

8.1 acquisitions; budgetary activities; disposal; life-cycle costs; personal property; planning activities; property; utilization

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