Answers to Frequent Questions: Total Cost of Ownership

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PURPOSE

Total Cost of Ownership (TCO) modeling is a tool that systematically accounts for all costs related to an information technology investment decision. This document provides answers to frequently asked questions about TCO modeling.

FREQUENT QUESTIONS ABOUT TOTAL COST OF OWNERSHIP MODELING

What is Total Cost of Ownership modeling?

Total Cost of Ownership (TCO) modeling is a tool that systematically accounts for all costs related to an information technology (IT) investment decision. TCO models were initially developed by Gartner Research in 1987 and are now widely used. Simply stated, TCO evaluates all costs, direct and indirect, incurred throughout the life-cycle of an IT asset, including acquisition and procurement, operations and maintenance, and end-of-life management.

While comparing the cost of different IT products and vendors can appear to be a simple task, there are frequently less obvious costs unrelated to the initial purchase price which can strongly influence the "best choice." In fact, the initial procurement cost is typically a relatively small part of the total cost of owning and operating most IT products.

How does TCO modeling differ from "life-cycle cost analysis" or "full cost accounting?"

Life-cycle cost analysis and full cost accounting are both systematic accounting approaches that seek to evaluate all costs associated with a product or practice, but TCO modeling is distinguished because it specifically evaluates IT products. These approaches can help organizations reduce total costs over time and document the benefits of practices like energy conservation and environmentally sound recycling.

Life-cycle cost analysis is often applied to energy technologies and building projects. For example, a life-cycle cost analysis can show that spending more initially on additional building insulation can produce a net savings (due to reduced heating and cooling costs) over the lifetime of a building.

The term full cost accounting is sometimes used interchangeably with life-cycle cost analysis, but is typically used to evaluate ongoing programs. For example, the U.S. Environmental Protection Agency promotes full cost accounting as an appropriate tool for evaluating the costs of local solid waste management programs. It allows a municipality to account for such things as avoided disposal costs associated with recycling that otherwise might not be taken into account.

These cost analysis tools are also sometimes used to identify externalities, like the reduced pollution resulting from recycling, or the purchase of electronic products with reduced quantities of hazardous substances. TCO modeling provides a systematic framework for considering these types of costs, as they relate to IT assets, and making better purchasing decisions.

Why should federal agencies and facilities use TCO modeling?

TCO modeling:

- Provides a consistent, systematic framework for comparing IT alternatives, increasing productivity and reducing overall costs over time.
- Establishes a standardized way to track and compare IT costs over time.
- Educates and raises awareness about the full costs of IT, showing that the initial IT procurement cost is a relatively small part of the full cost of ownership.

Federal agencies have additional incentives to use TCO:

- The Instructions for Implementing Executive Order 13423, Strengthening *Federal Environmental, Energy and Transportation Management*, direct federal agencies to "consider life-cycle costs and savings in planning and making determinations about investments in all capital assets, services, and procurements, which will lower the government's costs, achieve sustainable design principles, reduce energy and water consumption, and reduce the environmental impact/footprint of the government's operations," and more specifically "reduce the economic and environmental life-cycle costs of Federal electronic equipment."
- A wide range of federal policies and resources, such as Office of Management and Budget (OMB) Circular A-94: *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, encourage the use of life-cycle cost analysis. Additionally, OMB Circular A-131 requires federal agencies to use "value engineering," a tool similar to TCO modeling.

TCO modeling is particularly useful for federal organizations that are partners in the Federal Electronics Challenge because it is an established, widely accepted method for evaluating costs related to all three phases of IT ownership: acquisition and procurement, operations and maintenance and end-of-life management. TCO modeling can help justify certain costs by showing, for example, that purchasing and appropriately using an ENERGY STAR® qualified computer can significantly reduce overall costs, or showing that the cost of properly reusing or recycling a computer might be only 1 percent or less of the full cost of ownership.

What is evaluated in a TCO model?

The following table summarizes the types of costs typically included in a TCO analysis. These costs are broken down by the three electronics life-cycle phases: acquisition and procurement, operations and maintenance, and end-of-life management. Note that these costs are typically calculated on an annual basis by dividing by the expected product lifetime.

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Category	Examples of Costs
Acquisition and Procurement	• Administrative costs such as developing bid specifications, evaluating proposals, gathering data, budgeting, and negotiating. • Researching and evaluating options such as upgrade, rebuy, lease, or purchase. • Contracts, tracking purchases, transfer and delivery. • Hardware (purchase or lease), including personal computers (PCs), all peripherals, storage, networking, and other related equipment. • Spare systems and parts, annual supplies, and materials. • Software licenses.
Operations and Maintenance	• Administrative costs, including contract management, asset management, overseeing contractor services, a share of human resources, and other operating costs. • Vendor-contracted and/or in-house training of staff and IT personnel, product maintenance, and help desk support. • IT support such as database management, network management, and software management. • Retooling to accommodate new hardware and software. • Software and hardware upgrades over time. • Share of floor space, furniture, and other fixed office costs. • Internet and other network access costs. • Energy costs. • Training for IT staff and users. • Informal staff self-support of computer users. • Down time due to hardware/software malfunctions and/or user errors.
End-of-Life Management	• Administrative costs including asset management, documenting inventory, vendor contract procurement and management, and invoice payment. • Staging (removing and consolidating equipment). • Sanitizing hard drive and other storage media. • Testing and/or preparing for reuse, such as by reloading hard drive. • Providing follow-on support to employees or others purchasing used equipment. • Recycling/disposal fee and/or outsourcing fee. • Shipping. • Value of sold products and materials.

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What are typical values for TCO?

When Gartner first developed TCO modeling, its conclusion that PCs can cost an organization up to $10,000[1] per year was met with skepticism. Over time, the methodology and estimates of typical TCO values have been widely accepted. Although falling purchase prices and product improvements have steadily reduced total cost of ownership over time, studies still regularly show that PCs costing less than $1,000 typically have a TCO of more than $5,000 per year.[2] A $200 printer could easily have an annual cost of more than $1,000 when all the supplies and maintenance costs are included. Personal data assistants (PDAs) have a TCO of around $3,000, comprised of hardware, software and network services (60 percent), operations (30 percent), and administration (10 percent). Adding a wireless modem with a TCO of $1,392 can bring the PDA total cost to nearly $4,400.[3]

While the specifics of TCO calculations vary, they generally show that the initial procurement price is a relatively low percentage of TCO. For example, according to IDC, a market-research firm, a PC's TCO in 1998 was $5,236 per year, with only 15 percent of that attributable to procurement, 80 percent attributed to operations, and 5 percent to end-of-life management.[4] Other estimates suggest that end-of-life management can be less than 1 percent of a PC's TCO.[5]

What are some limitations of TCO modeling?

Like any tool, TCO modeling does have limitations. For example:

- Although very likely to reduce long-term costs, TCO modeling itself may initially add cost by asking procurement decision makers to gather and consider more information.
- Since TCO modeling tracks long-term, life-cycle costs, capturing the benefits of TCO analysis in a single year's budget can be difficult.
- TCO modeling does not assess risk or how well a particular technology fits with an agency's or facility's strategic goals or needs.
- TCO modeling does not necessarily track environmental or social costs and benefits.

What resources are available from the FEC?

The FEC has developed the TCO Calculator Tool, which allows users to compare the costs of different options for IT asset management with an emphasis on decisions that may have an environmental impact. The Tool is available as a Microsoft Excel® spreadsheet at the FEC Web site: http://www.federalelectronicschallenge.net/resources/docs/tco_tool.xls.

The "Resources" section of the FEC web site contains other tools and documents to assist partners with electronics acquisition and procurement, operations and maintenance and end-of-life management: http://www.federalelectronicschallenge.net/resources/index.htm.

[1] "Why is Total Cost of Ownership Important?" John Taylor Baily and Stephen R. Heidt. Darwin Magazine, November 2003.
[2] Ibid.
[3] Gartner Research, Press Release on PDA TCO. June 2002.
[4] As cited by Robert Houghton, presentation to the Federal Network for Sustainability, 2002.
[5] Rick Schulman, President, Freedom Electronics Recycling.

REFERENCES

The text of Executive Order 13423 and the Implementing Instructions are available at: http://ofee.gov/eo/eo13423_main.asp.

OMB Circular A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, is available online from the Office of Management and Budget at: http://www.whitehouse.gov/omb/circulars/a094/a094.html.

OMB Circular A-131, *Value Engineering*, is available online from the Office of Management and Budget at: http://www.whitehouse.gov/omb/circulars/a131/a131.html.

CONTACT INFORMATION

If you have questions related to this resource or need other assistance with the Federal Electronics Challenge, please contact your Regional Champion. The list of FEC Regional Champions is available at http://www.federalelectronicschallenge.net/champions.htm.

Partners may also request technical assistance via email to partner@electronicschallenge.net.

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Web site: http://www.federalelectronicschallenge.net/
E-mail: info@electronicschallenge.net