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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

PROCUREMENT AND SYSTEMS
ACQUISITION DIVISION

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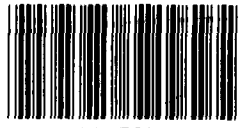
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The Honorable R. G. Freeman III
Administrator of General Services

Dear Mr. Freeman:

Subject: Evaluation of ~~the General Services Administration's~~ GSA Efforts to Implement Life Cycle Costing for Procurement of Commercial Products (PSAD-81-14)

We have evaluated efforts by the General Services Administration (GSA) to implement the use of life cycle costing (LCC) to procure commercial products. We found that GSA could improve its leadership role regarding Government-wide implementation of LCC and expand the use of LCC to procure its own needs and those of other agencies.

We reviewed procurement records and interviewed procurement officials at GSA headquarters, Washington, D.C., and Federal Supply Service (FSS) headquarters, Arlington, Virginia. We also obtained information on the use of LCC by State and local governments from the National Institute of Governmental Purchasing, Inc. At the conclusion of our evaluation, we presented our observations to GSA officials, and their comments were considered in this report.

A summary of the results of our survey follows. Additional details are included in the enclosure.

GSA'S RESPONSE TO OUR PRIOR REPORT ON LCC

In a prior report (PSAD-76-160, July 23, 1976), we recommended that GSA assume a stronger leadership role in coordinating and publicizing Government-wide LCC efforts and that GSA should develop an appropriate environment for interagency coordination of efforts to implement LCC.

In his October 1, 1976, response to our report, GSA's Administrator agreed that GSA should take a stronger

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leadership role in the Government-wide LCC effort and outlined plans for accomplishing this objective. To strengthen Government-wide leadership, a mechanism to coordinate and publicize LCC efforts was to be developed. The mechanism was to include training programs and the use of key contacts in Federal agencies. To accelerate internal LCC applications, additional potential items were to be identified, a milestone plan for each item was to be established, and the procurement process was to start on those items for which resources were available.

GSA'S EFFORTS TO IMPLEMENT LCC SINCE 1976

Since 1976 Government-wide implementation efforts primarily consisted of

--conducting workshops on LCC for Federal, State, and local governments' procurement personnel and

--performing a study of the potential for expanded use of LCC.

The LCC workshops, which were initially funded under the Experimental Technology Incentives Program, 1/ were discontinued in fiscal year 1978 due to a lack of interest on the part of procurement personnel in GSA and other agencies. During fiscal years 1976-78, 32 workshops were conducted and 618 persons attended.

The study report issued in May 1979, which was also funded under the Experimental Technology Incentives Program, concluded that there was a potential for expanded use of LCC by the Federal Government. Furthermore, the potential could be cultivated if one organization assumed a lead agency role.

Responsibility for the Government-wide leadership role was transferred from FSS to GSA's Office of Acquisition Policy in January 1980. No GSA staff had been assigned to the LCC effort as of August 1980, and a request for staff was rejected by the Assistant Administrator for Acquisition

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1/The Experimental Technology Incentives Program was initiated in fiscal year 1973 as part of the President's program to learn how the Government could stimulate technological innovation.

Policy purportedly because LCC had been assigned a very low priority.

Regarding internal efforts, FSS was using LCC to procure seven items in fiscal year 1976. Then LCC was discontinued for two of the items because the technique was determined to be impractical and suspended for two other items until new testing requirements were established. LCC was used or planned for procurements of four additional items during fiscal year 1980. In summary, FSS developed LCC techniques for 11 items since the program was initiated in fiscal year 1974 and was using LCC to procure 9 items by fiscal year 1980. Financial assistance was provided under the Experimental Technology Incentives Program for development of LCC techniques for nine of the items.

As of August 1980, FSS was developing LCC techniques for one new item. The use of LCC for other items was considered and rejected in prior years, primarily because a practical method to verify performance standards could not be devised or the resources needed for development efforts were not available.

LCC techniques for individual items were developed by teams with representatives from several organizations in FSS. Recent development efforts for four items were delayed because all the technical aspects had to be reviewed by one employee in addition to his normal duties.

While several FSS organizations provided staff for development efforts from time to time, only one employee was assigned to LCC efforts on a full-time basis, at any point in time, from the time the program was initiated until we concluded our evaluation in August 1980.

INCREASED USE OF LCC APPEARS FEASIBLE

Because of substantial savings attributable to LCC procurements, the large number of items procured by FSS, and extensive LCC efforts by State and local governments, the accelerated development of LCC techniques for additional items is warranted.

FSS estimated savings of about $2.5 million resulted from LCC procurements of only seven items during fiscal years 1975-79 by adding operating costs over the service life to unit prices of the products in each bid. Then the lowest overall cost, or LCC, was deducted from the overall cost

for the bid with lowest unit prices. In those instances where the LCC for the low bid based on the unit price was also the low LCC bid, no savings were attributed to the use of LCC. Total LCC development costs for the seven items had not been computed. Once LCC techniques have been developed, however, much of the expense can be allocated to subsequent procurements.

Since FSS manages over 4 million items and procures over $3 billion worth annually, additional items should have potential for application of LCC procurement techniques. Many factors, however, preclude the routine use of LCC. LCC is not appropriate, for example, when its development costs exceed the expected benefits of the procurements.

A number of State governments reported the development of LCC techniques for various items, besides those used by FSS. One noteworthy effort was that of Illinois, which was developing LCC techniques for 18 items. A report on municipal purchasing practices showed that 605 of the 1,326 cities reporting had used LCC when making capital equipment purchases.

FSS officials have identified the following impediments to the expanded use of LCC.

--Procurement regulations for civilian agencies do not address the use of LCC.

--Reliable performance test measures and evaluative criteria have to be established for new LCC items.

--LCC procurements frequently entail more evaluative testing than regular low-bid procurements.

--Government-wide guidelines are needed to provide uniform application of certain data that are used in many LCC calculations, such as discount factors for applications to future year costs and utility rates.

--Relatively few procurement personnel have LCC training and experience.

--LCC requires top-management support because the procurements depart from traditional practices and require more time to prepare and evaluate.

The primary ingredient needed to overcome these impediments is the commitment of top management to provide the necessary staff resources to get the job done.

CONCLUSIONS

GSA should improve its leadership role regarding Government-wide implementation of LCC. At the time of our evaluation, a mechanism to coordinate and publicize LCC had not been developed, staff resources had not been formally committed to Government-wide efforts, and workshops for procurement personnel had been discontinued.

FSS should expand the use of LCC to procure its own needs and those of other agencies. Since the LCC program was formally initiated in February 1974, procurement techniques for relatively few items have been developed and staff resource commitments have been limited.

We also believe top-management support and increased staff resource commitments can be justified based on the tangible benefits that have been achieved by the use of LCC to date.

RECOMMENDATIONS

We recommend that the Administrator of GSA give higher priority to LCC efforts and commit the staff needed to

--develop LCC policy and procedural guidance for inclusion in applicable procurement regulations,

--develop a mechanism to coordinate and publicize Government-wide LCC efforts,

--resume LCC workshops for procurement personnel, and

--expand the use of LCC for procurements of commercial products by FSS.

As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the Senate and House Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to interested committees and Members of Congress.

We would appreciate receiving your comments on these matters and would be pleased to discuss any questions you may have.

Sincerely yours,

W. H. Sheley, Jr.
Acting Director

Enclosure

ENCLOSURE I

EVALUATION OF THE GENERAL SERVICES ADMINISTRATION'S EFFORTS TO IMPLEMENT LIFE CYCLE COSTING FOR PROCUREMENT OF COMMERCIAL PRODUCTS

BACKGROUND

Life cycle costing (LCC) is a procurement technique for evaluating the total cost of a product over its useful life. It provides a means to overcome potential problems of increased operating and maintenance costs and reduced service life resulting from procurements made primarily on the basis of the lowest bid price. LCC also provides a means to insure procurements are most advantageous to the Government, price, and other factors considered in accordance with Federal Procurement Regulations. The basic principles of LCC have been supported by the Comptroller General's decisions for many years.

The development of LCC techniques usually requires input by four disciplines. The procurement specialist develops LCC provisions and administers the contract. The standardization specialist provides performance specifications and establishes the criteria for the LCC analysis. The quality control specialist establishes evaluation and test procedures for the item. The market research specialist determines customer demand for the item and designs a system for obtaining information on the item from the customer.

Factors in addition to price that may be considered when determining the total cost of a product include operating costs (energy, maintenance, and repairs), service life, and salvage or resale value. All factors may not apply or be feasible to use for a particular product, but consideration of only one factor is better than none. In the following table, the use of LCC to procure calculators shows that the lower unit price of one product may be offset by the lower operating cost and higher trade-in value of another product.

	Calculator A	Calculator B
Unit price	$300	$250
Operating costs (annual operating costs x years of service life)	350	420
Trade-in value	-75	-25
Total	$575	$645

We reviewed procurement records and interviewed procurement officials at General Services Administration (GSA) headquarters, Washington, D. C., and Federal Supply Service (FSS) headquarters, Arlington, Virginia. We also obtained information on the use of LCC by State and local governments from the National Institute of Governmental Purchasing, Inc. At the conclusion of our evaluation, we presented our observations to GSA officials, and their comments were considered in this report.

GSA'S RESPONSE TO OUR PRIOR REPORT ON LCC

We completed a study of LCC in 1976, which disclosed that GSA had taken steps to implement LCC, which could yield benefits and that certain measures would enhance GSA's efforts to establish an effective LCC program. GSA agreed with our conclusions and described measures that would be taken to implement recommendations in the report.

In our July 23, 1976, report, we recommended that GSA assume a stronger leadership role in coordinating and publicizing Government-wide LCC efforts and that GSA should develop an appropriate environment for interagency coordination of efforts to implement LCC.

In his October 1, 1976, response, GSA's Administrator agreed that GSA should take a stronger leadership role in the Government-wide LCC effort and, in so doing, acquire better data from user agencies to assist GSA in making LCC-type procurements. The Administrator outlined plans for accomplishing this objective. To strengthen Government-wide leadership, FSS was to develop a mechanism to coordinate and publicize LCC efforts. The mechanism was to include training programs and the use of key contacts in Federal agencies with significant procurement operations.

To accelerate internal LCC applications in FSS, additional items with potential LCC application were to be identified, a milestone plan for each item was to be established, and the LCC procurement process was to start on those items for which resources were available.

GSA'S EFFORTS TO IMPLEMENT LCC SINCE 1976

Our recent survey disclosed that GSA could improve its leadership role regarding Government-wide implementation of LCC and could expand the use of LCC to procure its own needs and those of other agencies. Since 1976 Government-wide implementation efforts primarily consisted of

--conducting workshops on LCC for Federal, State, and local governments procurement personnel during fiscal years 1977-78 and

--performing a study of the potential for expanded use of LCC during fiscal year 1979.

Since 1976 FSS efforts regarding LCC applications primarily consisted of

--continuing the use of LCC to procure five items and

--implementing the use of LCC to procure four additional items in fiscal year 1980.

Technical and funding assistance was provided by the National Bureau of Standards under the Experimental Technology Incentives Program (ETIP) 1/ for many of the LCC efforts.

The LCC workshops were conducted to demonstrate the need for LCC and to illustrate LCC techniques. During fiscal years 1976-78, 32 workshops were conducted throughout the United States and attended by 618 persons--301 GSA employees and 317 employees from other Federal agencies and State governments. ETIP funded a contract totaling about $125,000 for the Logistics Management Institute to prepare the course and conduct the first few workshops. The remaining workshops were conducted by GSA personnel. A lack of attendance caused the workshops to be terminated in fiscal year 1978, when 15 were scheduled and only 4 were conducted.

The study of the potential for expanded use of LCC was conducted by the Stanford Research Institute and the Research Triangle Institute under an ETIP contract and by FSS personnel. 2/ The study report, issued in May 1979, based on responses from Federal agencies and trade associations, concluded that there was a potential for expanded use of LCC by the Federal Government and that the potential could be cultivated if one organization assumed a lead agency role. Regarding industry reaction, two-thirds of the trade association respondents viewed LCC as a good procurement technique

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1/ETIP was initiated in fiscal year 1973 as part of the President's program to learn how the Government could stimulate technological innovation.

2/"The Potential For Expanded Use of Life Cycle Costing As a Federal Government Procurement Technique: A Background Report," Research Triangle Institute, May 1979.

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for their products, even though almost half professed little or no knowledge about LCC before being contacted during the study. According to the study report, there appeared to be a need for further information on LCC among agencies and industry and a generally favorable response to its expanded use.

Responsibility for the leadership role in the Government-wide LCC effort was transferred from FSS to GSA's Office of Acquisition Policy in January 1980, but no staff was assigned to LCC as of August 1980. Furthermore, a request for the equivalent of 2-1/4 additional staff years for LCC functions was rejected by the Assistant Administrator for Acquisition Policy. According to an official of the Office of Acquisition Policy, the basic problem was that LCC had been assigned a very low priority.

As indicated by the following table, FSS initially selected seven items for LCC procurements during fiscal years 1975-76. Then two items were deleted and LCC procurements of two others were suspended. Recently, LCC was used or planned for procurements of four additional items. In total FSS developed LCC techniques for 11 items since the program was initiated in 1974. Financial assistance was provided under ETIP for development of nine of the items.

Items Selected for Procurement with LCC Techniques and Developed with ETIP Assistance

Item	LCC procurement						ETIP assistance
	1975	1976	1977	1978	1979	1980	
Air-conditioners	*	*	*		*	*	*
Clothes dryers						*	*
Dishwashers						*	*
Electric ranges		*	*	*	*	*	*
Gas ranges	*	*	*	*	*	*	*
Printer ribbons		*	*				*
Refrigerators	*	*	*			*	*
Subcompact sedans		*					
Typewriters						*	
Washing machines						*	*
Water heaters	*	*	*	*	*	*	*

FSS had to suspend LCC procurements of air-conditioners and refrigerators in 1978 until the Department of Energy's new energy efficiency testing requirements were established. As shown on the table above, LCC was subsequently used again to procure air-conditioners in 1979 and refrigerators in 1980.

LCC procurements of printer ribbons were terminated primarily because testing procedures were considered too time consuming and expensive. Apparently, the individual procurements were too small, and requirements would have to be consolidated to make LCC techniques cost effective.

FSS officials cited several reasons LCC was not used for subsequent procurements of subcompact sedans and other types of automobiles. The validity of estimated miles per gallon ratings developed by the Environmental Protection Agency was challenged by the manufacturers. FSS did not maintain records on maintenance costs incurred by Federal agencies that would be required to confirm stated performance standards in bids for LCC contracts. Competition was limited because some firms would not bid under congressionally imposed price limitations. FSS did, however, require that all passenger automobiles acquired by executive agencies achieve the fleet average fuel economy standard specified in Federal Property Management Regulations 101-38.1306.

As of August 1980, LCC techniques were being developed for fluorescent lamps, and FSS personnel were attempting to devise a method to verify stated performance standards. The use of LCC for other items was considered and rejected in prior years primarily because a practical method to verify performance standards could not be devised or the resources needed for development efforts were not available.

LCC techniques for individual items were developed by teams with representatives from several organizations in FSS. Recent development efforts for clothes dryers, dishwashers, refrigerator-freezers, and washing machines were delayed because all the items were assigned to one commodity standards specialist who had to review the technical aspects of LCC, in addition to his normal duties.

While several FSS organizations provided staff for the development of individual items from time to time, overall responsibility for LCC efforts was assigned to the Value Engineering Division, as part of the FSS Value Management Program. In addition to LCC, the Value Management Program included improvements proposed by FSS employees and submissions by contractors under the value incentive clause. Only one employee of the Value Engineering Division was assigned to LCC efforts on a full-time basis, at any point in time, from February 1974, when LCC was formally initiated, until August 1980, when we concluded our survey.

As shown in the LCC procurements table, financial assistance was provided under ETIP for the development of

LCC techniques for nine items. ETIP funds were used for extraordinary development expenses, such as additional travel, testing, personnel, and samples, not the total cost incurred by FSS. For the first three procurements of five items initially selected for LCC, funding under ETIP totaled $149,159, or an average of about $30,000 for each item. Funding for development of four items recently procured using LCC totaled only $614 as of July 1980.

INCREASED USE OF LCC APPEARS FEASIBLE

Because of substantial savings attributed to LCC procurements, the large number of items managed and the amount of procurements by FSS and extensive LCC efforts by State and local governments, the accelerated development of LCC techniques for additional items is warranted. GSA should be able to overcome most of the impediments to expanding the use of LCC that have been identified by assigning a higher priority and adequate staff to LCC efforts.

The following example of a water heater procurement illustrates the method FSS used to estimate savings from LCC procurements. Prospective contractors submitted energy consumption ratings as well as unit prices for their products, and FSS computed LCC for each bid by adding operating costs over the service life to unit prices. Then the lowest overall cost, or LCC, was deducted from the overall cost for the bid with the lowest unit prices.

	Water heater A	Water heater B
Prices for 7,650 units	$ 816,900	$ 706,550
Operating costs computed for the 10-year service life	3,366,715	3,803,545
Total LCC	$4,183,615	4,510,095
LCC for water heater B with the lower unit price		4,510,095
LCC for water heater A with the lower total cost		-4,183,615
Savings attributable to the use of LCC		$ 326,480

In those instances where LCC for the low bid based on the unit price was also the low LCC bid, no savings were attributed to the use of LCC.

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FSS estimated savings of about $2.5 million resulted from LCC procurements of only seven items during fiscal years 1975-79, even though no savings were attributed to 12 of the 25 procurements because LCC for the low bid based on the unit price was also the low LCC bid or problems were subsequently found in the formulas used to compute operating costs. As previously noted, ETIP funding for the development of five items totaled $149,149, but the total development costs incurred for the seven items had not been computed. Once LCC techniques have been developed, however, much of the expense can be allocated to subsequent procurements.

The number of items managed and the amount of procurements by FSS indicate that additional items have potential for application of LCC procurement techniques. During fiscal year 1979, over 4 million items were stocked or available and procurements totaled about $3.3 billion. Many factors, however, preclude the routine use of LCC. As examples, LCC is not appropriate when development costs exceed the expected benefits of the procurements, operating costs cannot be predicated with reasonable confidence or are insignificant in relation to unit prices, and stated performance standards are not verifiable.

Reports on LCC efforts by State and local governments also indicate additional items have potential for application of LCC procurement techniques.

A report prepared for the Department of Energy included LCC formulas used by State governments for the following items, which were in addition to those used by FSS. 1/

State	Item
Arkansas	Copying machines
	Ice machines
	Incandescent lamps
	Heat pumps
	Tractors
California	Heat pumps
North Carolina	Air compressors
	Copying machines
	Dehumidifiers
	Humidifiers
	Icemaking machines

1/"Energy-Efficient Procurement in State and Local Government (DOE/CS/5255-1)," Environmental Law Institute, July 1979.

Data provided by the National Institute of Governmental Purchasing, Inc., included similar listings of LCC applications for energy-consuming products by State and local governments. One noteworthy effort was that of Illinois, which was developing LCC techniques for 18 items. Some of the more unique applications were electric motors, tires, televisions, water coolers, and microfilm readers.

An Urban Data Service report on municipal purchasing practices published by the International City Management Association showed that 605, or 45.6 percent, of 1,326 cities reporting had used LCC when making capital equipment purchases.

FSS officials responsible for LCC efforts have identified the following impediments to expanded use of LCC.

--Procurement regulations for civilian agencies do not address the use of LCC.

--Reliable performance test measures and evaluative criteria have to be established for new LCC items.

--LCC procurements frequently entail more evaluative testing than regular low-bid procurements.

--Government-wide guidelines are needed to provide uniform application of certain data that are used in many LCC calculations, such as discount factors for applications to future year costs and utility rates.

--Relatively few procurement personnel have LCC training and experience.

--LCC requires top-management support because the procurements depart from traditional practices and require more time to prepare and evaluate.

GSA should be able to overcome most of these impediments by assigning adequate staff resources.

The Administrator of the Office of Federal Procurement Policy recently advocated including LCC in procurement regulations, and in a memorandum dated July 8, 1980, asked the Administrator of GSA to develop policy and procedures. With this endorsement, GSA should proceed with providing needed procurement regulations on LCC.

FSS has demonstrated the ability to develop performance test measures and evaluation criteria for new LCC items and

to meet the evaluative testing requirements of LCC procurements, on a limited basis.

GSA could meet the need for uniform application of data in LCC calculations with a mechanism to coordinate and publicize efforts and reinstitute LCC workshops to train procurement personnel.

Adequate support by top management could be promoted on the basis of the long-term LCC benefits.

CONCLUSIONS

GSA should improve its leadership role regarding Government-wide implementation of LCC. At the time of our survey, a mechanism to coordinate and publicize LCC had not been developed, staff resources had not been formally committed to Government-wide efforts, and workshops for procurement personnel had been discontinued.

FSS should expand the use of LCC to procure its own needs and those of other agencies. Since the LCC program was formally initiated in February 1974, procurement techniques for relatively few items have been developed and staff resource commitments have been limited.

We also believe top-management support and increased staff resource commitments can be justified on the basis of tangible benefits that have been achieved by the limited use of LCC to date.

RECOMMENDATIONS

We recommend that the Administrator of GSA give higher priority to LCC efforts and commit the staff needed to

--develop LCC policy and procedural guidance for inclusion in applicable procurement regulations,

--develop a mechanism to coordinate and publicize Government-wide LCC efforts,

--resume LCC workshops for procurement personnel, and

--expand the use of LCC for procurements of commercial products by FSS.