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Total Cost of Ownership Guide



325 Front Street West, Suite 300
Toronto, ON M5V 2Y1
t:416.861.1092 • 1.866.759.6014
www.oc-innovation.ca

The Innovation Procurement Toolkit (IPT) was created by the Healthcare Supply Chain Network (HSCN) and is now provided by OCI.

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TOTAL COST OF OWNERSHIP GUIDE

1. INTRODUCTION

Total Cost of Ownership (“TCO”) is a tool that analyzes the cost of a solution (equipment, goods, services and/or technology) over its entire lifecycle and is a major factor in determining value for money in certain types of purchase decisions. In the context of innovation procurement, TCO is an important concept because it enables the comparison of diverse solutions within a standardized framework. Calculation of TCO includes the accumulated costs of acquiring, operating, maintaining and disposing of and/or decommissioning procured equipment, goods, services or technology, less any residual value upon disposal. There is no one size fits all approach, and the TCO calculation will vary on a case by case basis. Quantifiable elements of value may include outcomes related to total cost of care, weighted risks and ability to achieve business objectives.

The decision to use TCO as the tool for evaluating and (optionally) negotiating cost must be made while developing the procurement strategy. TCO is resource intensive, relying on the collaboration of all stakeholders, and it is important to allow sufficient time to develop the model, solicit input during early market engagement and informed responses through the actual procurement, and to perform a quality analysis. TCO may not be applicable in all procurements, and the decision to use it vs. a more traditional analysis of purchase price only will depend on the variables associated with achieving the desired outcomes. In cases where there are many and complex variables, TCO will be a powerful tool to compare solutions. This guide provides one approach to TCO, however each procurement is unique, and significant thought will need to go into the appropriate approach and model.

2. APPROACH TO TOTAL COST OF OWNERSHIP

TCO can be used at various stages in the procurement process:

- to assess different business models before and during a procurement;
- to understand the different cost drivers during procurement;
- to demonstrate the total benefits and values being offered;
- to assess the comparative life-cycle costs of competing proposals; and
- to track actual costs and benefits against a budget as part of benefits realisation.

Defining and sharing clear objectives during the early market engagement phase will ensure a strong, shared understanding of objectives between the purchaser and potential suppliers. This also provides an opportunity for suppliers to provide input into the identification of relevant elements of cost and/or value, based on their experience, and for questions to be addressed prior to submission of responses to the RFPQ or RFS.

It is recommended the HSP develop a standardized TCO spreadsheet as a schedule to the procurement document. This will facilitate an “apples to apples” comparison of what might be disparate solutions and ensures that elements critical to the HSP have been addressed. Ask proponents to provide a detailed list of assumptions made when preparing the TCO, or to identify any variations on the assumptions

provided in the competitive document. Ensure there is ample space for proponents to provide narrative commentary to support or explain their pricing.

The TCO submission will be an important part of the discussion during planned dialogue and/or negotiation sessions. Seeking clarification and ensuring both parties have a full understanding of the potential costs will be critical to meeting desired outcomes and performance targets. The internal TCO team should be carefully selected at the beginning of the project, remain constant over the life of the project, include a financial or health economics expert and include representation appropriate to the procurement. For example, if the procurement is for a clinical application with a significant technology component, then not only clinicians but also IT should be part of the team early on. The costs related to technology often derail projects and are not always factored in well to the financial evaluation. Costs like infrastructure (servers, hardware), software support (3rd party products), IT resource time, interface costs etc. must be included.

3. CALCULATING THE TOTAL COST OF OWNERSHIP

The costs associated with an innovation procurement can be very complex, especially considering the solution is typically unknown and associated risk/gain sharing models will be linked to established performance requirements such as impact on budget or operational efficiencies. This is further complicated when the procurement takes a Research and Development (R&D) or innovation partnership approach because the final solution will likely not be identified during the initial procurement process. Assumptions will need to be made about what the solution will be, what performance levels will be expected and what the solution may cost over time. For purposes of evaluation and perhaps negotiation, it is useful to explicitly state the assumptions, noting they are subject to change, but thereby creating a model that is sensitive to the assumptions as a basis for future negotiation. A risk mitigation strategy will need to be developed, and the risk/gain sharing model will be a major element. Be sure to consider potential changes to government regulations and build in inflation.

In its simplest form, TCO includes the accumulated costs of acquiring, operating, maintaining and disposing of/decommissioning procured solutions (including benefits from disposal). End of life costs also include the costs associated with “off-ramps” or software held in escrow should partnership arrangements be dissolved.

A standard formula does not exist for all TCO calculations, rather the formula used will depend on the specific nature of the procurement. The following sample formula includes some of the key elements that should be considered in a TCO for the purchase of medical equipment:

Figure 1 - Total Cost of Ownership Standard Formula for Medical Equipment

TCO	=	Costs to Procure	+	Costs to Operate and Maintain	+	Costs at End of Life
<ul style="list-style-type: none"> • Involves all costs associated with ownership of each asset or solution • Calculated from procurement through contract cycle • Includes residual/salvage values 		<ul style="list-style-type: none"> • Unit price • RFP, evaluation and selection processes • License(s) or permit(s) • Internal systems support • Legal • Training and personnel • Conversion costs • Systems integration 		<ul style="list-style-type: none"> • Overhead • Maintenance • Upgrades • Consumables • Logistics and inventory management • Security and safety costs: • Insurance • Taxes • Supplier relationship management • Quality management • Reporting • Ordering and payments • Training and personnel 		<ul style="list-style-type: none"> • Decommissioning and/or destruction • Replacement or conversion costs • Data migration/wiping • Safety and security • Carbon footprint and environmental • Statutory compliance costs • Associated labour and personnel • Residual/salvage value (-) • Asset residual valuation • Transition out

Different types of costs make up these categories, such as:

1. **Direct costs:** costs that are attributed to a specific product or activity. Direct costs tend to be variable costs, e.g. the cost of consumables or labour.
2. **Indirect costs:** the costs that are not attributed to a specific solution. Indirect costs tend to be fixed and may include the cost of maintaining the entire HSP, like insurance and rent.
3. **Hard or tangible costs:** these costs are easily quantified, like renovation costs, freight, inventory, depreciation, and cost of returns
4. **Soft costs:** these costs are more intangible, like patient satisfaction, employee satisfaction, employee health and safety and reputation

Costs may be obvious or “hidden”, and sometimes it takes more effort to identify them. In this example, for a system acquisition, the hidden personnel costs are identified:

Figure 2 – Hidden and Obvious Costs

Acquisition Costs		Operating Costs	Change Costs
Software	Obvious costs	Obvious costs	Hidden costs
Hardware	Obvious costs	Obvious costs	Hidden costs
Personnel (Hidden Costs)	Hidden costs	Hidden costs <ul style="list-style-type: none"> • Systems operators • Systems programmers • Application programmers • Network admin labour • Storage management • IT management 	Hidden costs <ul style="list-style-type: none"> • Training • Loss of productivity • Change management
Network & Communication	Hidden costs	Hidden costs	Hidden costs
Facilities	Hidden costs	Hidden costs	Hidden costs

3.1 Net Present Value and Return on Investment

There are a number of metrics can be used to analyze cash flow in order to calculate the TCO, which includes net present value (or “NPV”), return on investment (or “ROI”), and internal rate of return. These are most applicable to high risk/high value procurements with many complexities.

When calculating TCO, HSPs must take into account the time value of money to determine the worth of the money when payment is required in the future. The formula to calculate the value of money at a future point in time is as follows:

3.2 Time Value of Money

The time value of money (or “TVM”) is the current value of the money and the amount of interest that it could earn over a period of time.

Future Value = Present Value * (1+ Discount/Interest Rate)^(Number of years)

3.3 Present value

Present value is the sum of money at the present time, in contrast to some future value it will have when it has been invested. The formula to calculate present value is as follows:

$$\text{Present Value} = \text{Future Value} / (1 + \text{Discount/Interest Rate})^{(\text{Number of years})}$$

4. COST CATEGORIES USED IN TOTAL COST OF OWNERSHIP

There are common concepts and cost categories used to describe different types of costs and benefits that can be applied when calculating a TCO. For purposes of an example, here is a list of categories that might apply for a capital equipment replacement project. Assume a business decision has been made articulating value as near-exact replacement of existing specifications, and the solution and outcomes are known.

Figure 3 – Examples of Total Cost of Ownership Cost Categories for Medical Equipment

Cost Category	Description
Initial Costs (one-time)	<ul style="list-style-type: none"> • purchase price • pilot/development • initial licensing • legal • packaging and delivery • deployment, installation and testing • conversion costs • change management/training • alterations to a building or room within a hospital
Technology Refresh	<ul style="list-style-type: none"> • Technology Refresh is the adoption of newer technology to meet the changing needs or reduce risk. It may include: <ul style="list-style-type: none"> • upgrading or replacing existing systems • adding new technology to the system • integrating with existing systems • disposing of any obsolete components • migrating or wiping data from the old system • Costs may include:

Cost Category	Description
	<ul style="list-style-type: none"> • equipment replacement • installation and testing • system/data storage changes
Operating Costs	<ul style="list-style-type: none"> • Consumables such as medical paper, apparel, safety, etc. • Labour for the service provided and maintenance of equipment • Utilities and services • Rental of space
Training & Education	<ul style="list-style-type: none"> • In many cases during the installation of new equipment or software, staff must be trained to use and administer the new solution. Training costs may include: <ul style="list-style-type: none"> • developing the training module • printing materials, such as workbooks and job aids • purchasing equipment, e.g. computers • hiring a trainer • renting a venue if off-site training is required • providing refreshments, meals, and transport • covering staff while away from their usual duties • In some instances, there may be costs associated with training patients to use equipment, especially if there is an application to be used in home or in a different care setting
Technology Support	<ul style="list-style-type: none"> • In the purchase of a software solution (whether associated with equipment or not) these factors can impact costs: <ul style="list-style-type: none"> • ongoing licensing and maintenance costs • “off ramps” in case of a need to switch a system from the supplier • source code escrow • other support and enhancements

Cost Category	Description
Preventive Maintenance	<ul style="list-style-type: none"> Maintenance conducted to the equipment and/or work to extend the life of the equipment (e.g., scheduled overhaul of the equipment, scheduled replacement of parts, etc.) Direct costs include labour, spare parts and consumables. Indirect costs include loaners or replacement equipment
Minor Corrective Maintenance	<ul style="list-style-type: none"> Corrective maintenance activities are carried out to identify and repair failed equipment, machines or systems to return them to fully functional working state In some cases, these corrective actions are managed with spare parts that are on hand and/or easy to install. If the equipment is covered by a service contract, these parts are usually included. Minor corrective maintenance typically represents less than 5% of the value of the equipment
Major Corrective Maintenance	<ul style="list-style-type: none"> These are unexpected and require financial and operational decision analysis to determine whether there is a requirement to repair the item Major corrective maintenance can represent 6% to 50% of the value of the equipment Outages that require major corrective maintenance can result in significant downtime. For critical equipment, this could have an impact on operations and service levels
Resale Value	<ul style="list-style-type: none"> There may be a resale / salvage value to certain solutions
Disposal Cost	<ul style="list-style-type: none"> There are disposal costs to specific items that are at the end of its life cycle (e.g., cost for disposing of hazardous items) There may be costs associated with migrating or wiping data from the old system, especially for patient information
	<ul style="list-style-type: none">

5. MEDICAL EQUIPMENT CALCULATION EXAMPLE

In the following example, an HSP is seeking to purchase medical equipment and the TCO analysis produces the following results:

Cost Item	Supplier A	Supplier B
Equipment	\$1,000,000	\$2,000,000
Accessories	\$500,000	\$400,000
Software	\$220,000	\$200,000
Initial training	\$60,000	\$60,000
Installation	\$500,000	\$200,000
Conversion costs	\$50,000	\$10,000
Initial Cost – Sub-total (A)	\$2,330,000	\$2,870,000
Consumables	\$50,000	\$30,000
Maintenance services (labor + parts)	\$200,000	\$100,000
Software upgrades	\$30,000	\$20,000
Additional training	\$20,000	\$20,000
Operational cost (annual) – Sub total	\$300,000	\$170,000
Subtotal (over 5 years) (B)	\$1,500,000	\$850,000
Operational cost Present Value (PV)* (E)	\$1,175,289	\$665,997
Disposal cost (PV) (C)	\$10,000	\$10,000
Residual value (PV) (D)	\$90,000	\$80,000
PV Cost of Ownership (A) + (E) + (C) – (D)	\$3,425,289.	\$3,465,997

*PV assumes a 5% interest rate

The result of the TCO comparison illustrated above shows that Supplier A's initial set up costs are lower; however, the annual operating costs are higher. After calculating the present value of the operational, disposal, and residual costs over the whole of the life of the medical equipment, which is 5 years, Supplier A is offering a more competitive TCO.

6. IMPORTANT NOTES

This guide is intended as a resource tool to assist HSPs in developing competitive procurement processes for innovative solutions. It is intended as a general reference, with commentary on issues and options with various innovation procurement models and features. This guide (and the accompanying templates) do not replace your organization's own procurement policies and processes. The IPT has been designed to be compliant with the BPS Procurement Directive. Organizations should seek legal advice on the application or modification of any template to meet their individual circumstances.

Please read the terms upon which this guide is provided at www.oc-innovation.ca. This guide is intended to be a dynamic document and will be updated over time.

Sources used for developing the documents in the HSCN Innovation Procurement Toolkit can be found in the [Compendium of Resources](#) posted on the HSCN website. These include examples of how organizations in various jurisdictions have executed early market engagement strategies and innovation procurement initiatives, with their lessons learned and supporting documents.