

How Understanding the Total Cost of Ownership of Your Equipment or Instrumentation Can Reduce Costs, Increase Performance and Improve Workforce Productivity

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Key Words

- Asset Management
- Service Management
- Outsource Model
- Total Cost of Ownership

In the competitive, highly regulated business climate that exists in the healthcare industry, acute care facilities are challenged to find creative ways to lower their costs without compromising the goal of providing high quality patient care, while maintaining compliance (JCAHO). Executives are specifically challenged with navigating their hospitals through a myriad of competing forces, such as federal regulations (HIPAA, BBA, and MPDIMA), payers, suppliers, other hospitals and most importantly, their patients. Considering these forces, it's more important than ever to deliver a sustainable competitive advantage by investing in core business competencies and optimizing the management of non-core activities. One such non-core activity is the lifecycle management of capital assets required to support your healthcare operation – from acquiring the asset, maximizing the operation, maintaining the performance and determining when to properly dispose of it.

So, what is Total Cost of Ownership (TCO)?

To manage and optimize the lifecycle cost of your assets, one must first understand the concept of total cost of ownership (TCO) and the factors that contribute to it.

Total Cost of Ownership, or TCO, is a concept used to represent all of the costs, including direct and indirect costs, associated with owning capital assets required to support your healthcare operations. For the purposes of this article, we are going to focus on capital assets – in particular, diagnostic imaging equipment, biomedical equipment and laboratory instrumentation. TCO seeks to identify and quantify all of the people, process and tool related expenses needed to operate and maintain equipment and instruments for the various departments, so that healthcare organizations can make more informed business decisions on new purchases and disposition based upon financial and non-financial factors.

Three factors that contribute to TCO are the process factor, product (or asset) factor, and productivity factor, which are categorized in the tables below, to highlight the direct and indirect costs associated with these factors during each phase of the equipment lifecycle. Thinking in these TCO terms should help to provide a clearer understanding of all of the costs associated with acquiring, operating, maintaining and disposing of assets.

This TCO understanding is crucial for effective management of costs, which includes optimization of assets. It is the first step in getting control of the asset and maintenance management process to implement strategies to help further support the organizations' goals for saving money, maintaining compliance and improving patient care.

How does one define Direct and Indirect Costs?

Direct costs are usually those costs that are planned within a budget, resulting in purchase orders being generated and invoices being paid. These costs are easier to identify and track than indirect costs. Indirect costs are typically hidden and not included in a budget, making them more difficult to measure and quantify, and often are not factored into the total cost of instrument and equipment ownership. An example of a direct cost is the purchase of a piece of equipment. However, if the purchase is not planned or hidden, due to the failure of another piece of equipment, then it becomes an indirect cost.

Depending upon a hospital's equipment maintenance strategy (preventive maintenance, corrective maintenance, training, upgrades and application support, regulatory and quality compliance, consumables, accessories, and supplies), these costs can fall into either direct or indirect cost categories. A proactive maintenance strategy may have more of these costs fall into the direct cost category by utilizing an outsourced asset and service management solution, which includes supplier management, maintenance management, preventive maintenance scheduling, and more. On the other hand these costs can also fall into the indirect cost category when a reactive maintenance strategy is utilized. A reactive maintenance strategy may be more reliant on corrective maintenance, which means you pay for services as the failure events occur or as the maintenance is needed. Due to the fact that these indirect costs are unplanned, many of the expenses that result can be fairly extensive but hidden to an organization due to the lack of visibility in the budget and the fact that operational costs are not as easily tracked. An equipment failure quickly becomes expensive to an operation due to the lost revenue, potential loss of patients, productivity loss, the cost of idle employees, the administrative labor cost to coordinate repair services and contact suppliers, track field service reports, and the possible payment of overtime to make up for lost revenue, or as mentioned above, the possible purchase of a new piece of equipment.

The Three "P" Factors

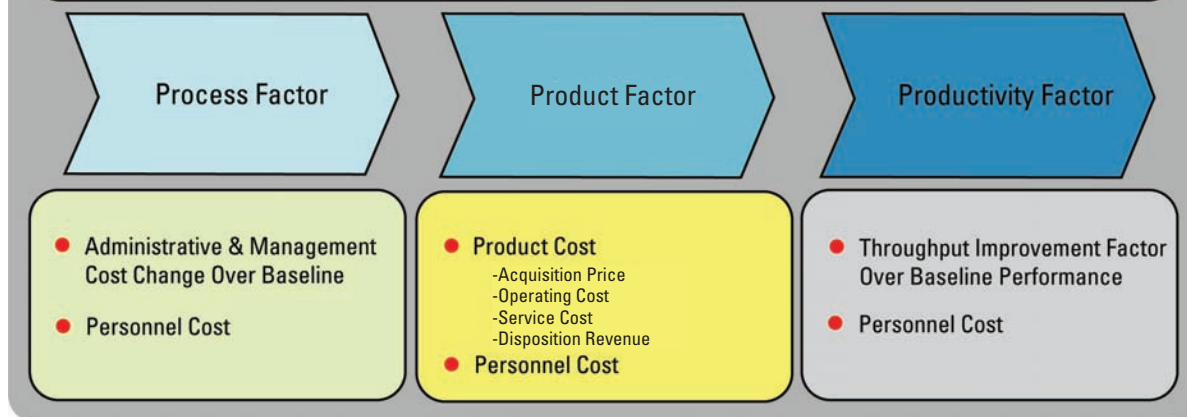
As mentioned above, there are three primary factors that need to be considered as part of TCO evaluation and management. Placing equipment lifecycle costs into these three categories allows for a more strategic view and analysis of the costs. It is with this view that critical success factors can be identified and a plan can be implemented to reduce TCO.

The Process Factor

Lack of good processes can have a major negative

Diagram 1

$$\text{Total Cost} = \text{Process Factor} + \text{Asset Factor} + \text{Productivity Factor}$$



Total Cost of Ownership (TCO): To reduce TCO look at all three (3) factors holistically to streamline administrative and management processes, rationalize your asset base, acquisition decisions and operating costs, as well as improve productivity through optimal service delivery; Consider outsourcing the management of your assets and your services to focus on your core competencies.

impact on the TCO in an organization. Often, the additional costs associated with poor or insufficient processes are extremely difficult to measure resulting in a total lack of visibility to how much potential money is being lost. Poor process management contributes to projects taking longer to complete or never being completed, incremental resources being allocated to help support projects, work load being re-distributed to other personnel, and re-prioritization of other initiatives and activities. On the other hand, though, good processes that are well executed enable organizations to more effectively utilize resources, leverage automation and track key performance metrics and results for continuous process improvement. This is the reason many companies have adopted LEAN, Six Sigma and other practical process improvement initiatives.

The primary indirect costs associated with the process factor are related to management and administrative personnel. These people supply the labor required to develop, implement, maintain, measure and continuously improve upon the healthcare organization's processes. The secondary indirect costs are the infrastructure and system components that serve as the backbone of the healthcare organization to support these processes.

As an organization do you have a process for managing the lifecycle of your equipment ownership? Do you know what the costs are?

Do you have a process for determining when a new piece of equipment needs to be purchased? Do you have the data to make the proper assessment on which model to buy from a particular manufacturer? Do you

know when an existing medical device will be retired, so that you can plan for a new piece of equipment in your budgeting process? Do you know how well the manufacturer has serviced your current inventory? Do you know if the physician or the end user will need be trained on the product or the application? Do you have a coordinated process between strategic sourcing, finance, department management and clinical engineering, so that everyone knows that the inventory needs to be updated and the equipment needs to be tracked and serviced? Is there a centralized service request process or do individuals within the various departments call the various manufacturers? Do you know if the preventative maintenance that was included in the service contract has been performed? Do you know what parts were replaced and if they came with a warranty? Do you know when your equipment will become obsolete and no longer supportable? Do you have a process for managing idle or surplus assets?

If the answer to some of the questions is "No," then you have hidden costs which can be eliminated and various opportunities for streamlining and improving processes. In the productivity factor, you will learn about the importance of establishing key performance metrics, which can help drive continuous process improvements.

Product (Asset) Factor

Unreliable equipment, as well as novice users, can also have a negative impact on the TCO. If a piece of equipment fails to perform as intended, the failure can be attributed to the equipment or the technician. Depend-

Process Factor (Costs related to managing and administering equipment & instrument ownership processes)			
Acquisition	Operation	Maintenance	Disposition
Needs Assessment	Continuing Education	Service Request Management	Redeployment
Planning & Budgeting	Inventory / Information Management	Service Event (PM) Management	Liquidation
Vendor Selection (RFP)	Compliance	Documentation Management	Disposal
Financing	Consumables Management	Data Management	Waste Management
Implementation / Training	Asset Tracking / Utilization	Retirement Management	Donation
Strategic Sourcing	Department Management	Engineering / IT / Facilities	Facilities

Enterprise Asset & Service Management System Costs - Software, Hardware, Implementation and Support

Table A

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- Service Management
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Product Factor (Costs related to owning instruments & equipment)			
Acquisition	Operation	Maintenance	Disposition
Equipment Purchase Price	Education / Training Costs	Cost of Repairs	Cost of Disposal
Financing Costs	Accessories	Cost of Preventative Maintenance	Storage Costs
Installation Costs	Consumables	Service Contract Costs	Revenue from Sale / Auction
Qualification Costs	Upgrades / Software Costs	On-Demand (Pay-Per-Use) Costs	Write-Offs
	Supplies	Parts Costs	Taxes
	Operator Costs	In-House Engineer Labor Costs	
<i>Enterprise Resource Planning (ERP) System</i>			

Table B

ing upon the type of equipment and the environment, a department may have a back-up piece of equipment which can be used when workload or tasks need to be shifted quickly. Unfortunately, the back-up equipment could be from a different manufacturer or have a different system configuration for which the user might not be familiar. Alternatively, identifying and standardizing on the highest quality equipment and ensuring that physicians, nurses and technicians are trained and competent to work with them can contribute greatly to an organization's ability to provide quality patient care.

The primary direct costs associated with the product factor are the easiest to quantify because they are usually included in the budget (assuming some of the processes referenced above are in place). These are the initial costs or prices that an organization incurs to buy equipment and instruments, consumables, supplies and various services. The secondary indirect costs are the costs of the individuals – physicians, nurses, technicians - responsible for utilizing the equipment in their daily patient care efforts. These individuals are essential components of a healthcare organization and rely heavily on both the processes within an organization and the products (in this case, the equipment) to be successful.

Do you know how much you are spending on your equipment throughout their lifecycle? Do you know if the end-users have received the proper training?

How many different suppliers (manufacturers and service providers) are you managing? Are you buying and standardizing on the best equipment available? Are you, subsequently, buying and standardizing on the supplies and consumables? Are you leveraging your purchasing power and volume? Have you compared the ownership of one piece of equipment from one manufacturer to another to know if you're getting the best value for your money? Are your technicians trained on how to use all of the equipment? Do you know if it's going to cost more to service a particular piece of equipment than if you were to purchase a new piece of equipment? Should you purchase the upgrade or buy a new device?

If the answer to some of the questions above is, "No," then you have hidden costs which can be eliminated by rationalizing your asset base and reducing the number of suppliers with whom you do business. These activities will not only maximize your purchasing power and increase your operator performance, but also reduce

some of the management and administrative burden referenced in the processes above.

Productivity Factor

The productivity factor is often overlooked because it is the most difficult to measure and quantify. However, it is also the most important factor of the three. The productivity factor is critical in determining how well you're managing equipment according to the previous two factors. This will provide a baseline from which to improve the efficiency and throughput of your administrative, clinical and technical personnel, as well as the performance of your equipment.

To measure the productivity factor, an organization must develop a scorecard with five (5) to six (6) internal key performance metrics that are in alignment with the organization's goals and linked to individual performance objectives. A baseline should be established and benchmarked against industry standards. Benchmarking can take place internally with a different site or hospital in your network or externally through consultative organizations. Regardless, the productivity factor is dependent upon effective benchmarking over time. This is because productivity is relative. It's relative to how well you performed in the past, how productive you are today and how you compare against other organizations. Then, the organization must identify critical success factors to be put in place to achieve any specific performance metric objectives.

The primary indirect costs associated with the productivity factor are related to equipment and instrument performance, such as reliability, uptime, patient throughput, and utilization, as well as administrative personnel transactions, clinical user utilization, and service provider performance. The secondary indirect costs are software functionality requirements needed to capture the data and generate these key performance metrics and reports.

Do you know how well your equipment and your people are performing from a productivity perspective?

Do you have key performance metrics for measuring the productivity of your personnel and the performance of your equipment? Do you have internal business processes to measure the number of activities and patients by employee? Do you know how many pieces of equipment of the same modality have been purchased from

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Productivity Factor (Costs related to benchmarking and measuring Key Performance Metrics)			
Acquisition	Operation	Maintenance	Disposition
Cost per Purchase Order	Clinical Operator Utilization	Uptime / Downtime (Elapsed Time To Repair ETTR)	# of Idle / Surplus Assets
Cost per Invoice	# of DRG's	Response Time	# of Assets Redeployed
# of Assets by Manufacturer	# of Samples per Lab Technician	Mean Time To Repair	# of Assets Sold
# of Assets by Equipment Modality	Asset Utilization	Same Day Fix Rate	
	Training Time	PM Completion Rate	
	Mean Time Between Failure	In-House Labor Utilization	
<i>Enterprise Asset & Service Management System Functionality - Capture Data and Generate Reports</i>			

Table C

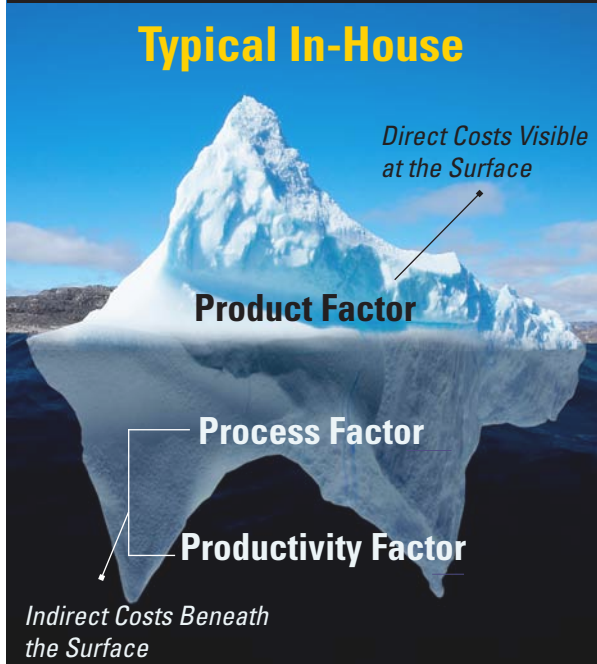
different manufacturers? Do you know the failure rate of your equipment by a specific manufacturer? Do you know how efficient your operators are? In a given month or year, do you know the utilization rate of your equipment or sample throughput rate of laboratory instruments, so you can justify the purchase of an additional piece of equipment? Do you know how often assets are being utilized to make decisions on how much preventative maintenance (PM) should be rendered? Do you know how well your service providers are performing? Do you know what your PM completion rate is? Do you know if PM's are being delivered on-time? Do you know how well your in-house biomedical engineers perform relative to your other service providers? Do you know how many idle or surplus assets are resident in the organization? Do you know if there are opportunities for redeploying or using some of those assets internally?

If the answer to some of the questions is "No," then you have hidden costs which can be eliminated by identifying key performance metrics, establishing a baseline and determining performance goals to be achieved by implementing certain critical success factors. These metrics will not only provide the organization with visibility to productivity, but will also provide the information needed to make more informed business decisions, which will have major positive impacts on the process and product factors.

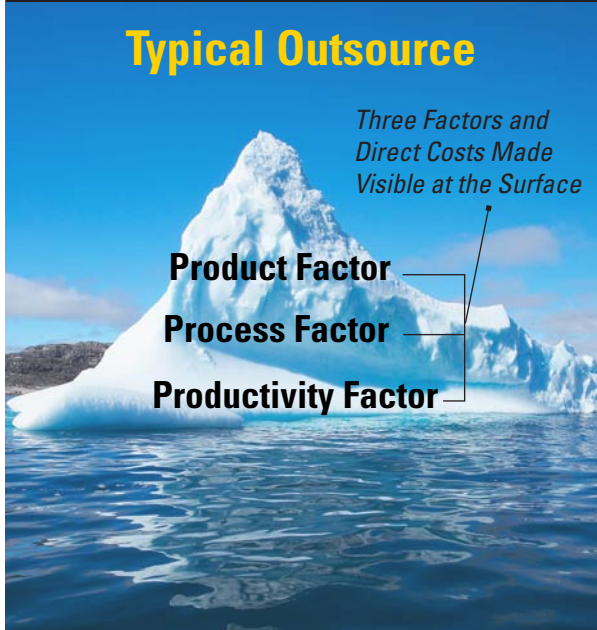
Summary

Healthcare organizations can save money, increase equipment performance and improve workforce productivity by understanding the lifecycle costs associated with equipment and instrument ownership and by implementing effective, proactive strategies and tactics to optimize the three factors. The three factors – process, product and productivity – can be broken down into the four phases of the equipment and instrument lifecycle – acquisition, operation, maintenance and disposition – and can be evaluated by analyzing the people, processes and tools used to support the phases. Each factor and each business decision made in each one of the phases has an impact on the other factors. Hospitals that are successful in looking at TCO holistically will improve their profitability and sustain a competitive advantage over their competition.

Total Cost of Ownership: In-House Maintenance Model vs. Outsource Asset & Service Management Model



Total Cost of Ownership: In-House Maintenance Model vs. Outsource Asset & Service Management Model



An outsourced, integrated asset & service management solution provides visibility to the maintenance costs of all three "P" factors and enables improvements in profitability.

In addition to these offices, Thermo Fisher Scientific maintains a network of representative organizations throughout the world.

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Thermo Scientific 3D Model, integrated asset and service management solution, is part of LIFECYCLE Enterprise Solutions, a complete portfolio of services and management solutions from acquisition to disposition, including operations and maintenance, designed to help you improve your productivity, reduce your total cost of ownership and ensure compliance across your entire enterprise.

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