

**Solution Building**

**V. Total Cost of Ownership**

When we purchase items in our personal lives, such as new electronics or appliances, we know that the purchase price is not the total expense of that acquisition. In most cases, however, we never consider these ancillary expenses, although intuitively we know that they are there. In some situations, we do explicitly consider them, performing a business case analysis in our heads before the purchase by weighing the total costs against the tangible and intangible benefits associated with the acquisition. Sometimes we don't think about the business case until after the acquisition is complete, and we experience "buyer's remorse" because we did not consider all of the costs involved or do not realize all of the expected benefits.

To fully understand the financial ramifications of our decisions, we must consider the total cost of ownership before we make any acquisitions. This concept is something we are very familiar with when we are making a major purchase in our daily lives. In general terms, the **total cost of ownership (TCO)** is the sum of all costs associated with an acquisition that will accumulate over the life of the asset. One of the personal acquisitions for which we use the TCO is the purchase of a new car. Clearly, the purchase price is not the only consideration. Today, automakers recognize the importance of the TCO to their customers; in their advertising, they talk about gas mileage, resale value, length of warranty, free servicing over some period of time, and special financing terms.

You can see an example of a basic TCO for a Toyota Prius in table 2.1, below.

**Table 2.1**  
**Total Cost Analysis for a Toyota Prius**

Depreciation	\$6,752
Financing	\$3,458
Insurance	\$7,696
State fees	\$344
Fuel	\$3,594
Maintenance	\$1,444
(Detail)	
Repairs	\$524
Hybrid tax credit	-\$1,575
Total five-year ownership costs	\$22,239
Vehicle class	Midsize
5-year ownership cost	\$22,239
5-year cost, similar vehicles	\$33,758
Difference	\$-11,519

Source: Intellichoice, 2007

When buying a car, people use the TCO to help them decide among different vehicles and manufacturers based on their needs and the benefits the vehicle will provide. When we do this, we are comparing the TCO to the **total benefits of ownership (TBO)** (business case analysis) before making a final decision. The TBO comprise tangible and intangible benefits. The TCO also comprises tangible and intangible costs.

It is important to note that determining the TCO and TBO is not an exact science because neither the benefits nor the costs can be forecast with absolute certainty. In many types of business analysis, this is recognized by assigning a probability to factor into the analysis. A probability of 1.0 defines certainty, or 100 percent probability, and is the highest probability value. Something that has a probability of 1.0 is that if, on Earth, you drop a large rock, it will move downward, toward Earth. The other extreme is a probability of 0.00, which means that something will never happen. Using the same example, there is a probability of 0.00 that if you drop a large rock on Earth, it will move upward, away from Earth.

Most situations do not happen at the extremes of probability and have probabilities somewhere between the two extremes. The probability can be used to determine an expected **value**, or the validity of the value of the cost or benefit. To take this concept into account, we use expected- value calculations.

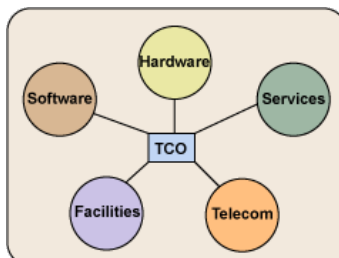
In layman's terms, the **expected value** is a calculation that serves as the best prediction of a value. In financial gobbledegook, it is the probability-weighted average value of all possible outcomes. Understanding the expected value of a possible future event allows us to make mathematically sound decisions. We can decide if we want to make an investment. We can assign a reasonable price for our services. We can prioritize requirements. We should use expected value when we calculate return on investment, or ROI (Tyner Blain, 2006).



**Think About It 2.1: Expected Value**

Because there are many different components, structures, probabilities, and interrelated cost alternatives, determining the TCO of IT infrastructures can be both complex and difficult. Each alternative, with its TCO, also has TBO that must be considered. The importance of this analysis cannot be overemphasized because of the interrelationship and required coordination among the infrastructure elements and the time span over which the decisions will affect the business. Figure 2.12, below, depicts the IT infrastructure as it relates to the TCO.

**Figure 2.12**  
**IT Infrastructure Related to TCO**



The colored circles in figure 2.12 represent the different elements of the infrastructure, and the colored background represents the required coordination of the elements, because coordination can have a significant impact on the costs associated with any single element.

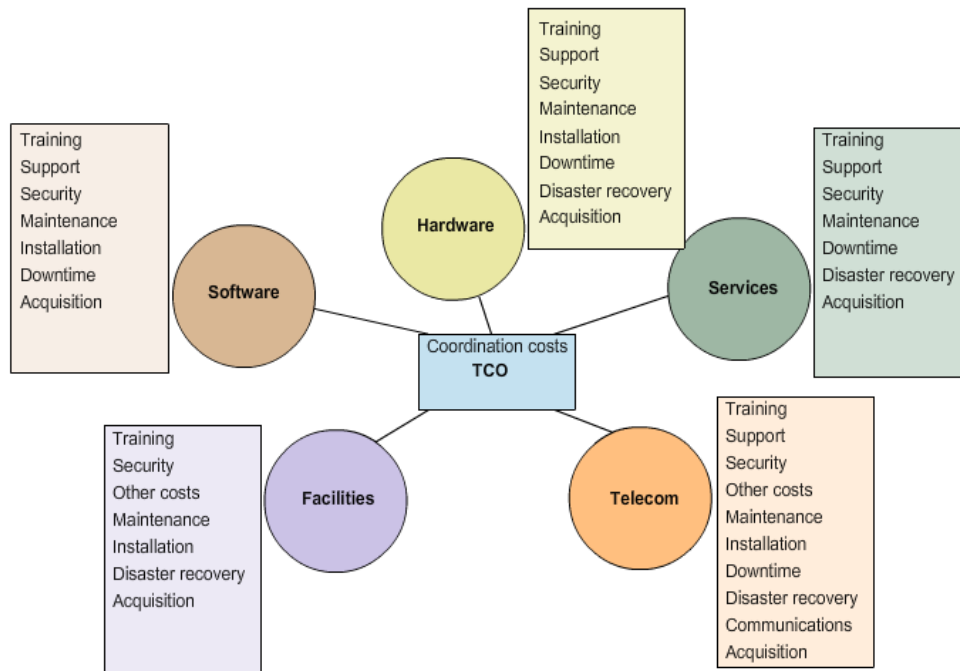
Table 2.2, below, identifies the cost categories of an IT TCO. Although the list in your textbook may be more detailed, this list contains some of the often overlooked and crucial costs that are important to understand.

**Table 2.2  
Cost Categories of an IT TCO**

Cost Categories	Description
acquisition	the costs of acquiring IT assets, including research, travel, freight, and tax
installation	the costs of making IT assets operational; could include building modifications, increased cooling requirements, and increased utility capacity
training	the total cost of training for personnel involved with IT assets; could include users, technical staff, customers, or business partners
support	the cost of keeping the infrastructure functioning as planned; could include a help desk, hardware technicians, telecommunications specialists, programmers, and maintenance support staff
maintenance	the cost of keeping IT assets current and in a condition that can meet their planned functions; could include maintenance contracts, programmers, and telecommunications specialists
communications	the cost of all communications, including network costs, wiring, service provider fees, communications hardware, and software
downtime	the costs associated with the loss of an infrastructure service, including user lost time, lost sales or business, loss of user or customer confidence, and lost production
disaster recovery	the costs of ensuring continued operation of the infrastructure, including maintenance of a current plan, cost of backup sites and equipment, costs of emergency power, and costs of practice exercises
security	the costs of ensuring security of the infrastructure, including security software, usage monitoring, and facility security costs
other costs	the costs of non-IT resources needed for the operation of the infrastructure, such as disks, tapes, paper, recruiting and contract negotiation, and administration
coordination costs	the costs related to keeping the infrastructure tuned to maintain optimal performance when changes to an infrastructure element are required

Not all of the costs listed above are applicable to all of the infrastructure elements. Figure 2.13, below, aligns the cost categories with the five elements of the infrastructure where they would most commonly be found.

**Figure 2.13  
IT Infrastructure with Cost Categories**



Most of these items or services can be achieved in different ways that can affect the level of service and the costs, for example, outsourcing the entire IT function (or some parts of it) to gain cost benefits. This adds to the complexity of managing an IT TCO while ensuring that optimum TBO are achieved. This is an example of why management of the IT infrastructure is a key component of both the IT strategy and the operating budget in both the IT department and the business organization.

As we have seen, the actual components of the infrastructure can be contingent on business structure and operation. Regardless of organization size or objective, however, all of the elements will be present. If the architecture selected is mainframe, the specific components of the infrastructure will be different from the client server or enterprise Internet architectures; however, many of the decisions that affect costs will be the same.

Support of the infrastructure and its components can be done with a mix of resources (employees and contractors). These staff members can be on site or at other locations, or even outsourced to a foreign country like India or the Philippines. The actual mix that a company uses will be based on costs, service level required, and reliability.

We have only to look at how we manage the costs of supporting our own home computer systems to understand the costs of supporting an IT infrastructure in an organization. For our homes:

- We can purchase a computer, rent a computer, or perhaps rely on the public library's computer system, our employer's computer, or UMUC's computer labs.
- If we own or lease the computer hardware, support will be required.
  - We may decide that the computer will not likely fail, but if it does, we will call a local technician.
  - We may pay for a maintenance contract with the computer manufacturer or a third party.
  - We may even rely on our own skill to repair the hardware.
- We make decisions about software that we need and our own upgrade policy.
  - We may decide that we will never upgrade our software because we know how it works and we need no additional features.

Think about what the impact of these decisions is when a business has to make them, particularly when the business has critical systems, without which it cannot function. For instance, Walmart's very competitive advantage lies in its supply chain management system.



[Try This 2.1: IT Infrastructure and Costs](#)

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