The Transformation of Total Cost of Ownership

The importance of incorporating the cost of frozen capital and energy efficiency in calculating Total Cost of Ownership (TCO)

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Management Summary

- Total Cost of Ownership (TCO), which seeks to calculate the full cost – acquisition, operation, maintenance, training, etc. – of business equipment, machinery and systems, is undergoing an evolution.

- An increasing proportion of financial managers are now starting to incorporate two further factors into the TCO model:– the time cost of money and free cash flow issues (characterised by SFS as ‘frozen capital’); and savings through energy-efficiency.

- Because the new TCO model has, in this way, become much more compelling and concrete for general managers – delivering clear cash savings - they tend to take the TCO concept much more seriously.

- Both these new factors raise the issue for TCO models not only of calculating the full costs associated with equipment or machinery (‘what it costs you’), but also the most financially efficient way of acquiring and using that equipment (‘how you pay for it’).

- Frozen capital is defined as funds that are tied up in equipment purchase and therefore not available for alternative business activities such as sales and marketing campaigns, new product development or competitor acquisitions.

- With energy prices rising around the world, organisations are also keen to upgrade to more energy-efficient equipment so as to reduce their total cost of ownership.

- How are organisations to liberate frozen capital, and afford energy-efficiency upgrades?

- Bank credit remains tight in mature economies, and is expected to remain so in the near-term in an atmosphere of slow economic growth and concerns about stability in the Eurozone.
• In developing economies, SMEs often find it difficult to access credit, established businesses need to find enough financing to fuel their rapid growth and financing arrangements need to be aligned to operating benefits to ensure that growth is sustainable in the long-term

• Against a background of restricted access to traditional credit, asset finance techniques (particularly leasing and renting) are filling the gap, enabling both the freeing up of frozen capital, and the ability to invest in energy-efficient equipment

• In particular, financing methods are coming to market which offset the energy-efficient investment cost against energy savings across the financing term, effectively providing a zero-net-cost investment technique

• This paper reviews these emerging shape of TCO, which is now embracing these two additional payback factors, and is gaining wider recognition with general management
Introduction

What is total cost of ownership, or TCO? TCO is a financial model or estimate whose purpose is to help enterprise managers determine the direct and indirect costs of a product or system, rather than simply the purchase cost of equipment. It is formulated into management accounting systems that can be used in full cost accounting or – latterly – environmental economics where it includes energy-efficiency impacts, carbon emission costs and social costs. In manufacturing, TCO is starting to embrace (lost) opportunity costs of not upgrading key technology (whether in terms of energy consumption or productivity). This also extends to other technology sectors, such as healthcare, buildings management controls, public infrastructure development, IT infrastructure, space heating and air conditioning, vehicles and a variety of motor-driven processes, to name but a few.

This paper seeks to highlight the range of factors which now have to be considered in a total cost of ownership model. It also covers how technology acquisitions are financed – encapsulated in the concept of frozen capital, a TCO ‘cost’ that SFS has been studying for some years in the healthcare and industrial sectors. The authors of this paper anticipate that this redefinition of TCO will help both equipment acquirers and equipment vendors build credible models which calculate total cost of ownership more accurately, and thereby enable more intelligent acquisition decisions. This subject is of particular importance both for embattled mature economies facing pressures of business investment decisions, as well as developing economies seeking to make investment decisions in technology (and technology upgrades) that produce meaningful, measurable and sustainable return on investment.

Background

Some historical background is informative. Looking at the world’s largest economy, the first technology article in the New York Times that mentions “total cost of ownership” dates from March 1995. Entitled “The Executive Computer; A Dinosaur in Open Systems Clothing”, it talks about the AS/400. Yet an advertisement from 1967 highlights total cost of ownership as a crucial skill for a “Support Systems Life Cycle Cost Analyst” for the aerospace industry. The term ‘total cost of ownership’ itself has largely been focused on the IT industry, but perhaps only because the IT industry has generated the largest body of press comment in recent decades. TCO analysis was popularized by the Gartner Group in 1987. Yet this was long into the term’s history. A 1976 article in the Journal of Finance, “Leasing, Buying,
and the Cost of Capital Services," discusses the “total cost of ownership” for production machinery. More remarkably, a review in Quality Progress from 1968 notes, “Total cost of ownership is being used profitably in the elevator industry.”

Since these early uses of the phrase ‘total cost of ownership’, there has been a considerable body of analysis covering TCO in various applications, whether IT, manufacturing, product-to-market, facilities management, data centre operations or other spheres.

**TCO – The Old Definition**

How much does an industrial pump cost? How much does an office air-conditioning system cost? How much does a hospital heating and lighting system cost? What does a data centre cost? It is still the case that most business leaders – whether corporate executives, facilities managers or plant engineers will answer with the purchase price. In fact, however, capital outlay is only a fraction of total operating expenses for factory plant, buildings technology, healthcare equipment, IT and a host of other technology types. Total cost of ownership (TCO) also embraces administration, maintenance, service, outages (time lost when the equipment fails), user training and so on. At least, these are the factors which have been calculated as part of the TCO models to date. As an illustration of the importance of TCO calculations, one example from the chemical industry notes that “initial cost typically represents less than 10 per cent of TCO.”

While TCO cost accounting embracing these additional factors is loosely followed by most financial directors and management accountants, there has also always been a level of general management scepticism about too slavish adherence to TCO, mainly because many technology providers have tried to use the concept as a means of persuading buyers to upgrade their equipment. Part of their argument has been that, not only will maintenance costs increase as equipment gets older, but there will be an opportunity loss from not having access to the latest, most productive equipment. Internal buyers, quite rightly, only value productivity gain if ultimately it can produce increased sales and greater market share. Since this is dependent on sales success, then success is dependent on more variables than simply acquiring the new equipment.

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4 Processor, “What’s Old is New”, March 2008
6 Data Center Knowledge, “Key factors impacting total cost of ownership”, July 2012
7 T Dabbs, “Optimizing Total Cost of Ownership (TCO)”, 2010
However, TCO appears to be undergoing something of a renaissance, mainly as a result of two new metrics which pioneering financial managers are now starting to factor into their cost models. Those two factors are (1) the cost of frozen capital and (2) savings from energy efficiency. The first of these is critical, especially in the current global economy, to being able to compete and grow. The second saves money from the bottom line from day one, making the investment lower- or no net cost. The following two sections describe these factors and explain how they are making TCO a key subject not just for financial management, but for managers and directors across the board.

**Putting Frozen Capital into the TCO Equation**

For some years, Siemens Financial Services has been studying financing techniques in a number of different areas, within both the public and private sector, particularly industry and healthcare. One of the most compelling findings of these studies has been that both of these sectors are not making the most efficient use of available financing tools. Literally billions (of dollars, euros, pounds, remnimbi, etc.) of capital equipment spending annually is being tied up in outright equipment purchasing, with the result that these funds are ‘frozen’, unable to be used for other purposes. Inability to access this frozen capital – especially when access to capital has become restricted – is increasingly recognised as a TCO ‘cost’.

The Siemens studies have examined the frozen capital situation both in mature economies (US, UK, France, Germany and Spain) as well as in higher growth economies (Russia, Poland, Turkey, India and China). In mature economies, frozen capital is a problem because organisations are finding it more difficult to access affordable borrowing since the financial markets crisis and subsequent economic downturn. With regulators in the Western world having universally tightened capital adequacy rules for banks, then this situation is likely to become a permanent one. In terms of total cost of ownership, frozen capital must be taken into account as an opportunity cost. For a commercial organisation, this opportunity cost might be not having the funds to mount a tactical sales or marketing campaign, or develop a new product, or even make a competitor or development acquisition. In the public services, frozen capital robs liquid funds to deliver greater levels of front-line services.
In higher growth economies, frozen capital prevents access to sufficient funds just at the moment when they are needed. In other words, an organisation which has purchased equipment outright in its first phase of development may have used up its available lines of credit. However, the organisation requires further credit to maintain its rapid growth path and seize all the opportunities in front of it. A further factor is one of sustainability. Although higher growth countries are keen to build their business and public infrastructure quickly, they are also very keen to ensure that this is done in a financially sustainable way. No nation wants its meteoric growth to come to a halt because it is financially unsustainable. Therefore, there is considerable interest in financing techniques which align outgoings (monthly/regular payments) with financial benefits (such as reduced costs, greater throughput or improved productivity).

In short, leading financial managers are paying attention not just to what something costs, but how they pay for it. What is the best application for an organisation’s own funds, and when should it access private sector capital to finance its capital equipment acquisitions, leaving its own cash free for more nimble competitive or service delivery uses? Asset finance solutions are being seen as particularly appropriate to the TCO mind-set because, rather than simply funding the purchase cost of equipment or systems, they can also cover other TCO requirements, such as installation, maintenance, service, training, even upgrades and consumables. In other words, asset finance allows access to the latest business technology, without the opportunity cost of tying up large amounts of capital – making an important positive contribution to TCO.

Billions of capital equipment spending is being tied up in outright equipment purchasing annually. As a result, these funds are “frozen” and cannot be deployed for other value-driven business activities such as marketing campaign or competitor acquisition. In terms of total cost of ownership, this frozen capital must be taken into account as an opportunity cost. By aligning outgoings (payments) with benefits (savings/productivity), asset finance allows organisations access to the latest technology, without the opportunity cost of tying up large amounts of capital.
The Role of Energy Efficiency in TCO Calculations

Equally compelling as the issue of frozen capital, is that of energy-efficiency. Out-dated equipment, be it manufacturing plant, air conditioning, lighting, cooling or heating, is consuming far more energy than modern alternatives. Moreover, all over the world, the trajectory of energy prices is inexorably rising.

Take the example of industrial motors (which drive pumps, fans, production lines and so on). Worldwide, there are approximately 20 million industrial motors—with vast potential for saving energy. Drive technology accounts for two-thirds of industrial energy consumption. Given that energy-efficient industrial drives have a service life of ten years, in an example where there are 2,000 hours of operation annually, the acquisition cost accounts for less than 3% of total costs. Energy costs, by contrast, account for over 95%.

Heating, ventilation and air conditioning (HVAC) is another chief consumer of power. According to one respected research organisation, “Air conditioning can increase a building's energy consumption and associated carbon emissions by up to 100%. Heating and hot water can account for 60% of total energy costs." Technologies that enable combined heat and power (CHP) can make a significant contribution to improving energy efficiency by generating electricity and heat simultaneously. Ideally, the demand for heat is first reduced, and then the CHP scheme is sized to meet the new heat load. In some schemes, overall efficiency is further improved by ‘trigeneration’ – using additional absorption chillers to convert waste heat into cooling.

In addition, improved buildings automation can also provide up to 80% of potential savings in an organisation. Implemented correctly, automation can increase productivity, reduce downtime and minimise maintenance requirements – whilst simultaneously cutting energy consumption and reducing carbon emissions.

So organisations face a dilemma. They know they need to upgrade out-dated equipment and infrastructure to improve efficiency and productivity, but this can be at the time when their traditional sources of finance are becoming reluctant to lend (in mature economies), or...
Rising energy prices make energy efficiency a key consideration in TCO calculations. Asset finance solutions help organisations acquire energy-efficient equipment by offsetting the investment costs against energy savings across the financing terms, effectively providing a zero-net-costs investment technique.

where their rapid growth path is making it difficult to access sufficient capital for equipment upgrades (higher growth economies).

Once again, financing techniques can come into play to fund these energy-efficiency investments in a way that does not freeze capital and helps minimise total cost of ownership. Asset finance plans are emerging on the market specifically designed to enable energy-efficiency investments. In a nutshell, these schemes wrap everything into a single financing package, including the energy efficiency assessment, the equipment itself, installation etc., all via a loan, lease, rental or hire purchase arrangement. Payments are designed to be equal to, or lower than, the energy savings and in many cases deliver savings and net positive cash flow immediately. Where a project cannot completely offset the equipment upgrade with energy-efficiency cost savings, the financing arrangement nevertheless subsidises the larger part of the upgrade cost.

A finance agreement under this kind of integrated scheme has the potential advantage of tax efficient, fixed payments for the agreement term, which are calculated taking into account the type of equipment, its expected working life and the customer’s individual circumstances. In addition, the customer taking out the finance may be able to wrap other aspects such as service into their monthly payments, as well as negotiate upgrades and add-ons in the future as their needs change.
Conclusions

Within business environments, economists have for many years advocated ownership of appreciating assets (property being the classic example) and the ‘rental’ or leasing of depreciating ones (vehicles and technology). Therefore, TCO models are now not only focusing on the full range of costs of acquiring and operating their key business equipment and systems (“what you pay”), but are also now embracing financing methods (“how you pay”) into the TCO equation.

In particular, organisations want to avoid the opportunity cost tying up, or ‘freezing’, funds in equipment purchase that is better deployed on competitive drives, value acquisitions or improved service delivery. In addition, with energy costs continually rising, energy-efficiency has become a key component of TCO calculations, recognising the need to eliminate unnecessary energy spending where possible.

Asset financing techniques – especially leasing arrangements – appear to be filling the gap left by restricted access to traditional business credit. They are able to cover equipment, maintenance, service, training, even upgrade – and are therefore particularly suited to the TCO approach. And they are often the favoured method used to create financing packages that align outgoings (payments) with benefits (savings/productivity), especially in a world where access to traditional forms of bank credit look like they will be permanently squeezed under the new, more exacting, regulatory regime.