

Total Cost of Ownership As A Decision Making Technique

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Abstract: In business, there is a concept called total cost of ownership or TCO for short. It's different than the simple purchase price of an item. For example, imagine that you are the business owner of a flower company. You are thinking of purchasing a brand new flower delivery vehicle complete with refrigeration so the flowers don't wilt during delivery. Instead of relying on just the purchase price when considering whether to purchase this truck or not, you use the total cost of ownership. This cost includes not just the purchase price, but also all related ownership costs such as insurance, registration, maintenance, and repairs.

Keyword: Total Cost of Ownership, Uses, Cost to Price, Different Cost, Calculation.

I. INTRODUCTION

Total cost of ownership (TCO) is an analysis that places a single value on the complete lifecycle of a capital purchase. This value includes every phase of ownership: acquisition, operation, and the softer costs of change management that flows down from acquisition such as documentation and training.

A. Who Uses TCO?

Those who purchase or manage computing systems have had a keen interest in TCO since the late 1980s. At that time, IT industry analysts began publishing studies showing a vast difference between IT systems prices and systems costs. And, not surprisingly, these soon got the attention of IT vendor sales teams and marketers.

Competitors of IBM, for instance, used their own TCO results to argue that IBM systems were overly expensive to own and operate. This kind of argument is possible because the five-year total cost of ownership for substantial hardware and software systems—from any vendor—can be five to ten times the hardware and software purchase price.

Today, TCO analysis supports purchase decisions for a wide range of assets. These include especially items with significant maintenance and operating costs across ownership life. The total cost of ownership is, therefore, at center stage when leaders face purchase decisions for large IT systems, vehicles, buildings, laboratory equipment, medical equipment, factory machines, and private aircraft, for instance.

As a result, TCO for these kinds of assets is a central focus in the following:

- Budgeting and planning
- Asset lifecycle management
- Prioritizing capital purchase proposals
- Evaluating capital project proposals
- Vendor selection
- Lease vs. buy decisions

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B. How does Total Cost compare to Price?

Total cost of ownership (TCO) highlights the difference between purchase price and long-term cost. This analysis came into the spotlight starting in the mid-eighties due to the expenses in supporting hardware and software IT acquisitions. Managers discovered that supporting the equipment and software could cost between 5 and 8 times the purchase price.

Once the differences between total cost of ownership (TCO) and price came into the forefront, companies began to take advantage of this calculation for a number of different capital investment decisions: buildings, vehicles, manufacturing equipment and information technology infrastructure.

There are a number of different ways this analysis is useful to decision makers. Total cost of ownership (TCO) analysis can help make critical lease vs. buy comparisons. By incorporating this into the acquisition process, it directly impacts outcomes in vendor selection, prioritization of capital acquisition, and overall corporate budgeting.

C. What is included in TCO Analysis?

There are three key components to TCO calculations:

1. Acquisition/Physical Hardware Costs
2. Operating Costs
3. Personnel Costs

Let's look at each of these in turn.

II. ACQUISITION COSTS

Acquisition/Physical Hardware costs include the cost of equipment or property before taxes, but after commissions, discounts, purchasing incentives, and closing costs. Sometimes this will include one-time peripheral equipment or upgrades necessary to installation or utilization of the asset.

A. Operating Costs

Operating costs include subscriptions or services needed to put the item into business use. This includes utility costs, direct operator labor, and initial training costs.

B. Personnel Costs

Personnel overhead may include administrative staffing, support personnel to the equipment, facility housing the equipment and operators. This may include ongoing training and troubleshooting labor for maintenance purposes.

C. Accounting Contributions

True total cost can include not only costs but incremental savings or revenue flows created by the capital investment.



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The change in cash flows versus the "business as usual" option is what mitigates total cost of ownership (TCO). Those monies must be valued using Net Present Value calculations to consider the values over time.

Real total cost of ownership (TCO) analysis is a critical tool in the decision-making toolbox for any sized business. It requires both an understanding of the investment considered and the potential business impact to find the right answer.

III. CALCULATION OF TCO

"Total Cost of Estimation is an estimation of expenses associated with purchasing, deploying, using and retiring a product or piece of equipment. In short it is the purchase price of an asset plus the cost of operation."

The TCO basically considers all the costs needed to purchase the equipment ie Initial Purchase cost, Logistics, Insurance, Depreciation as well as all the Operational Costs like Maintenance Costs, Downtime of the Machines, Consumables required by the machine.

The TCO is calculated to compare different operating conditions of the machine and select the best machine based on price, quality, availability and performance. On this basis, by calculating the TCO on the basis of Status of the machine, its energy consumption, and its downtime, one can

Some Basic Assumptions are as Follows,

1. Loan Interest- 8% of Initial Cost
2. Insurance- 2% of initial cost
3. Set up cost- 5%
4. Logistics- 3%
5. Depreciation - 10% p.a
6. Cost of used machines- 70% of initial cost
7. Cost of electricity – INR 5/kWh
8. Number of working days – 251 days/year

determine whether the machines selected can be deemed operable or not.

The TCO can also be used to compare old and used Machines and with the help of this comparison, the best possible machine type can be selected. On one hand newer machines have a higher initial cost and higher investment but on the other hand, they have a lesser downtime cost and lesser operational and maintenance cost. One must also take into consideration whether the machine is available to install in the market or not. Whereas in the case of used machines, one can save a lot on initial investment but lose out a lot on the cost of downtime and higher maintenance cost. Therefore, a systematic TCO analysis is necessary.

The cost of the machines for a factory could be based on factors like Purchase Price, Interest, Logistics Cost, Energy Cost, and in terms of Operating cost one could consider Setup Cost, Logistics Cost, Energy Cost and Training Cost considering the fact that these costs vary for used and new machines respectively.

The total cost of machine is to be evaluated and subsequently the cost savings are to be determined. The best option can be chosen thereafter. For analysis, 6 main Machines named A, B, C, D, E and F are considered.

Table 1: Shows the TCO of New and Use Machines

Sr. No.	Machine Name	TCO New (INR)	TCO Used (INR)	Percentage Savings
1	A	259023.42	260236.76	0.46%
2	B	104192.06	63866.05	38.70%
3	C	32048.84	20772.04	35.18%
4	D	132222.26	81036.16	38.70%
5	E	16425.78	10727.48	34.69%
6	F	7815.26	7848.19	0.42%

Hence based on Availability and cost the following machine decision can be made.

Table 2: Showing the State of the Machine Selected.

Sr. No.	Machine Type	Machine State
1	A	New
2	B	Used
3	C	Used
4	D	Used
5	E	Used
6	F	New

Now that the machine states for the different machines are decided, the Total Costs and the Total TCO can be computed.

The Initial Cost of the Machine can be determined based on Purchase Price and Interest and also considering the Insurance on the Machines as follows,



Table 3: Showing Inital Cost of Machines

S. No.	Machine Name	Machine Type	Initial Cost of Machine		
			Purchase Price	Interest	Insurance
1	A	New	110282	77298.88	39701.52
2	B	Used	45773	31169.28	16478.28
3	C	Used	12800	12288	4608
4	D	Used	58100	55776	20916
5	E	Used	6468	6209.28	2328.48
6	F	New	2472.4	2373.504	890.064
	TOTAL		235895.4	185114.9	84922.34

Next, the Operational Costs in terms of Setup Costs, Logitics Costs, Energy Costs and Training keeping in mind that the Cost of Electricity and the number of working days are as follows,

Table 4: Shows Operating Costs of Machines for Factory

S. No.	Machine Name	Machine Type	Operating Cost			
			Set up	Logistics	Energy	Personnel Training
1	A	New	5514.1	4411.28	1681.848	2400
2	B	Used	2288.65	1830.92	2061.15	800
3	C	Used	640	512	1832.04	800
4	D	Used	2905	2324	3206.16	800
5	E	Used	323.4	258.72	19.08	800
6	F	New	98.89	98.89	85.872	800
	TOTAL		11770.04	9435.81	8886.15	6400

Lastly the cost based on Maintanance, Production and Depreciation can be calculated as below,

Table 5: Shows Maintanance, Production and Depreciation Costs for Machines.

S. No.	Machine Name	Machine Type	Maintenance Cost	Production Cost	Depreciation Cost
				Consumables	
1	A	New	2205.64	4500	11028.2
2	B	Used	915.46	1500	4577.3
3	C	Used	256	1500	1280
4	D	Used	1162	1500	5810
5	E	Used	129.36	1500	646.8
6	F	New	49.448	1500	247.24
	TOTAL		4717.91	12000	23589.5

Finally, the differnent costs as a Percentage of the TCO (See Fig 1) is arrived. This helps in systematically allotting the cost in terms of Invetment Costs, Operational Costs and Other Costs.



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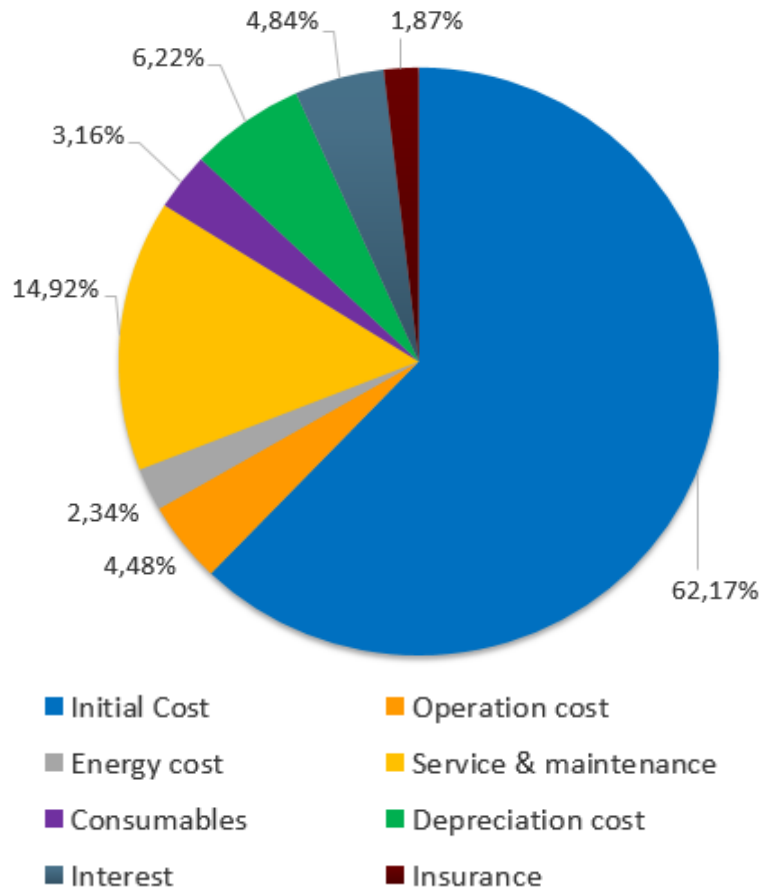


Fig 1: Shows The Different Types of Costs as a Percentage of TCO

Thus by calculating the TCO of all machines, one can have a structured and well defined layout of all the costs which also acts as a basis for calculating which state of machine to use and also what the total investment and operating cost would be.

IV. CONCLUSION

TCO analysis can find only two kinds of business benefits cost savings and avoided costs. Either of these benefits can show up when comparing TCO for different scenarios. The example above shows, for instance, that when TCO is less under a "Proposal" scenario and greater under a "Business as Usual" scenario, the results are cost savings under the "Proposal" scenario.

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