

Motor Vehicle Cost

File A3-40

Regardless of whether you already own or are planning to purchase a car, van, pickup truck, grain truck, semi, or other type of motor vehicle, knowing the cost of owning and operating the vehicle is important for making business and personal decisions. Costs are usually computed on a “cost per year” or “per mile driven” basis.

Operating Costs

Operating costs are also called *variable* costs because they are only incurred if you operate the vehicle. These costs vary directly with the number of miles or hours driven and include fuel, tires, maintenance, and repairs. If the vehicle is being used in a business and you are hiring someone to operate the vehicle, operator labor may also be included.

Fuel

Fuel mileage can be easily estimated by the individual operating the vehicle. For new vehicles, [Environmental Protection Agency \(EPA\)](http://www.epa.gov/compliance-and-fuel-economy-data), www.epa.gov/compliance-and-fuel-economy-data, estimates can be used. Dividing fuel cost per gallon by miles per gallon gives you the fuel cost per mile.

For example, if the cost of gasoline is \$3.00 per gallon and your vehicle gets 25 miles per gallon, the cost per mile is 12 cents ($\$2.50 / 25 = \$.12$).

For an electric vehicle, the fuel equivalent would be electricity cost and can be calculated as the dollar per kilowatt-hour (kWh) divided by the vehicle efficiency or electricity used to travel 100 miles.

Tires

The cost of tires per mile can be computed by dividing the cost of a set of tires by the expected life of the tires in miles.

Maintenance and Repairs

Maintenance and repair costs are more difficult to estimate. Repair costs occur because of routine

maintenance, wear and tear, and accidents. The best data for estimating repair costs are records of your own past repair expenses. Good records indicate whether a vehicle has had above or below average repair costs and when major overhauls may be needed. They will also provide information about your maintenance program and your mechanical ability.

Without such data, though, repair costs must be estimated from average experience. Older vehicles will have higher and less predictable repair costs. When repairs and maintenance are performed by the owner, include both the cost of the parts and labor.

Labor (optional)

If the motor vehicle is used for business purposes, you may also want to include the cost of operator labor. If the operator is paid by the hour or by the mile driven, the cost is an operating or variable cost and can be included here. However, if the operator is hired by the month or year, you should include labor as a fixed cost.

To compute labor cost per mile when it is paid by the hour, you must estimate the amount of driver time per mile. This can be done by dividing the labor cost per hour (wage) by the average speed of the vehicle. For example, a driver paid \$15 per hour to drive a grain truck at an average speed of 50 miles per hour costs 30 cents per mile ($\$15 \text{ per hour} / 50 \text{ mph} = \$.30 \text{ per mile}$).

The actual number of hours an operator works is often more than the actual driving time. The operator may be involved in loading and unloading the truck, waiting in line, maintaining the vehicle, or performing other duties. To take this into account, the number of hours can be expanded beyond the actual driving time. For example, if the operator spends a third of their time loading and unloading and only two-thirds of the time driving,

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the driving time needs to be expanded by a factor of 1.5 to account for the loading and unloading time.

Total Operating Cost

Fuel, tires, maintenance, repairs, and labor costs are added together to calculate total operating cost.

Ownership Costs

Ownership costs (also called *fixed* costs) usually include depreciation, interest on borrowed money, license, and insurance. In some situations, you may want to include the cost of housing for the vehicle. The cost of a personal charging station should be factored in for electric vehicles. Also, you may want to include the cost of operator labor if it is paid on a monthly or annual basis.

Ownership costs are incurred regardless of the number of miles driven. For example, if the annual ownership cost of a car is \$2,000 and you drive it 10,000 miles per year, the cost is 20 cents per mile ($\$2,000 / 10,000 = \$.20$). However, if you only drive it 5,000 miles per year, the cost is 40 cents per mile ($\$2,000 / 5,000 = \$.40$). Conversely, if you drive it 20,000 miles per year, the cost is only 10 cents per mile ($\$2,000 / 20,000 = \$.10$). So the more you drive the vehicle, the lower the ownership cost per mile.

Depreciation

Depreciation is the decline in the value of a motor vehicle due to wear, age, and obsolescence. Age and accumulated miles of use are usually the most important factors in determining the remaining value of a machine. Also, the introduction of new technology or a major design change may make a vehicle suddenly obsolete, causing a sharp decline in its remaining value.

Purchase price, years the vehicle will be owned, and sale or salvage value of the motor vehicle need to be estimated. The ownership life of a vehicle is the number of years that you expect to own it. It is often less than the motor vehicle's actual life because most people trade-in a motor vehicle before it is completely worn out. Sale or salvage

value of the vehicle is what you expect it to be worth when you sell or trade it.

A new pickup that costs \$50,000 that you plan to own for 5 years and then sell for \$20,000 will have an annual depreciation of \$6,000 ($(\$50,000 - \$20,000) / 5 = \$6,000$). If the pickup is expected to have 12,000 miles of use per year, depreciation is 50 cents per mile ($\$6,000 / 12,000 = \$.50$).

If you already own the vehicle and want to know what it is costing you to own and use it, estimate the vehicle's current market value, the number of additional years you expect to own it, and its value at the end of the period. For example, if your car is worth \$10,000 today, you expect to own it for another four years and you estimate its sale value at \$5,000, depreciation is \$1,250 per year ($(\$10,000 - \$5,000) / 4 = \$1,250$). If the car is expected to travel 10,000 miles per year, depreciation is 12.5 cents per mile ($\$1,250 / 10,000 = \$.125$).

For vehicles that are leased, the lease payments will replace depreciation and interest.

Interest

If you borrowed money to purchase the vehicle, you will have an interest cost. The interest cost is the interest rate multiplied by the amount of outstanding debt.

For vehicles that are leased, the lease payments will replace interest and depreciation.

License and Insurance

Annual license and insurance costs are usually minor costs when compared to depreciation and interest, but they need to be included. Actual expenditures can be used.

Labor (optional)

In certain business situations, you may want to include the costs of the driver of the vehicle. If the operator is paid a fixed amount per month or per year, it can be included as a fixed cost because the same cost will be incurred regardless of the number of miles driven during the time period.

However, if the operator is paid per hour or per mile, the cost should be included as a variable or operating cost, as explained earlier.

If the operator is paid \$40,000 per year, of which half of the time is devoted to driving the vehicle, and the annual mileage of the vehicle is 50,000 miles, the operator cost per mile is \$.40 per mile ($\$40,000 / 2 = \$20,000$) ($\$20,000 / 50,000 = \$.40$).

Total Ownership Cost

The total fixed ownership costs include depreciation, interest, license, insurance and fixed labor.

Total Cost

After all costs have been estimated, the total ownership cost per year can be added to the operating cost to calculate total cost to own and operate the machine.

Cash Expenditures (optional)

You may be interested in only the cash expenditures associated with driving the motor vehicle. All of the operating costs are also cash expenditures. In other words, you make a cash payment for them every year. The ownership costs are also cash expenditures, except for depreciation which is not included. Conversely, the principal payment on debt is included, although it is not actually a cost.

Use Decision Tool A3-40, [Motor Vehicle Cost Analyzer](http://www.extension.iastate.edu/agdm/crops/xls/a3-40motorvehiclecost.xlsx), www.extension.iastate.edu/agdm/crops/xls/a3-40motorvehiclecost.xlsx, to calculate ownership and operating costs for a vehicle per mile and per year.