



Research Methods in Science in Engineering

Project Budgets

Slide 1

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What Costs Money?

- Labor
- Materials and supplies
- Travel to conferences and the customer
- Equipment purchases
- Software and licenses
- Consulting fees
- Publications and posters
- **Benefits and overhead**

 EMPossible

Slide 2

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Total Direct Labor (TDL)

Direct labor costs include all of the money that is directly paid to employees in their paycheck.

	R	H	$R \cdot H$
Person	Hourly Rate	Hours to Work	Cost
Kelly Sánchez	\$20	40	\$800
Pedro Garcia	\$20	2080	\$41,600
TOTAL:			\$42,400

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Fringe Benefits

While not directly in the paycheck, employees also get fringe benefits.

- Health insurance
- Worker's compensation
- Retirement plans
- Sick leave
- Family and medical leave
- Subsidized meals
- Commuter compensation
- Paid vacation

This is typically calculated as a percentage of the employee's salary.

$$\begin{array}{r}
 \text{Total Direct Labor (TDL): } \$42,400 \\
 \text{Fringe Benefits Rate: } 33\% \\
 \hline
 \text{Fringe Benefits: } \$13,992 \\
 \text{TOTAL COST OF LABOR: } \$56,392
 \end{array}
 \quad = \text{rate} \times \text{TDL}$$

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Total Direct Cost (TDC)

Total direct cost (TDC) includes everything that an organization will have to pay for during a project.

TOTAL COST OF LABOR:	\$56,392
Materials & Supplies:	\$1,022
Equipment:	\$286,000
Travel:	\$4,299
TOTAL:	\$347,713

Materials & Supplies

Materials and supplies are the smaller and consumable items that must be purchased to execute the project. The materials purchased by a project can only be used by that project. A breakdown of materials and supplies costs is typically required in a proposal.

MATERIALS & SUPPLIES BREAKDOWN				
Item	Qty.	Price Per	Cost	Notes
Dielectric Slabs	4	\$25.00	\$100.00	See attached quote
Thermocouples	50	\$11.95	\$597.50	See attached quote
Adhesives	5	\$15.00	\$75.00	See attached quote
Consumables: gloves, masks, etc.	1	\$250.00	\$250.00	Engineering estimate
TOTAL:			\$1,022.50	

Capital Equipment

Federal law requires that equipment purchased by project has to be specifically needed by that project, can only ever be used by that project, and may be collected by the customer at the end of the project. Equipment must cost more than \$10,000 and have an operational lifetime over three years. Equipment for generic use by the organization must be purchased out of profit or from the overhead.

Typically, a breakdown of the equipment to be purchased and a justification of cost is required in a proposal. Justification is typically a quote.

CAPITAL EQUIPMENT				
Item	Qty.	Price Per	Cost	Notes
High Performance Computers	2	\$12,000	\$24,000	See attached quote
nScript 3D Printer	1	\$250,000	\$250,000	See attached quote
Oscilloscope	1	\$12,000	\$12,000	See attached quote
TOTAL:			\$286,000	

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Travel

Travel expenses must be justified. Expenses include airfare, car rental, hotel, Uber/taxi services, food, and others. Food expenses cannot exceed per diem. Alcohol is not a reimbursable expense.

<https://www.gsa.gov/travel/plan-book/per-diem-rates>

TRAVEL BREAKDOWN		
Trip #1 -- IEEE Conference	#	Justification
Number of People	2	
Number of Days	4	
Airfare (two way per person)	\$600	See attached quote
Total Airfare:	\$1,200	(# people)*(\$ airfare)
Per Diem (per day)	\$153	Orlando, Florida. March 2022, Federal Per Diem Rates
Total Per Diem:	\$1,224	(# people)*(# days)*(\$ daily per diem)
Lodging (per night)	\$200	See attached quote
Total Lodging:	\$1,600	(# people)*(# days)*(\$ nightly rate)
Car Rental / Transportation	\$275	Total cost for trip
TOTAL:	\$4,299	Airfare + Per Diem + Lodging + Car

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Total Cost

Total cost is the dollar amount that an organization charges the customer.

Total Direct Cost (TDC):	\$347,713	
Overhead Rate:	49.50%	
Total Overhead:	\$172,118	= rate × TDC
SUBTOTAL: \$519,831		
Fee Rate:	7%	
Fee:	\$36,388	= rate × subtotal
SUBTOTAL: \$556,219		

Overhead

Overhead includes all expenses related to doing business that is not directly attributed to a project.

- Building lease/rental
- Electricity and utilities
- General purpose computers
- Secretary and administration
- Office supplies
- Etc..

An organization must predict overhead expenses for the coming year. If they underestimate, they have to eat the expenses. If they overestimate, they have to pay back the government for overcharging.

It is very important to estimate overhead accurately. Companies invest a lot of money to estimate their overhead and how to apply it to contracts.

Modified Overhead

Many organizations use a modified overhead model. Some examples are:

- Overhead is only charged to the first \$10k of equipment

Fee

For-profit organizations are usually allowed to charge a fee up to 7% of the total cost of the project.