

Cost-Benefit Calculator - Instructions for use

This calculator is intended to be used under the following conditions:

- Your company directly pays the costs of workers' comp claims (i.e., self-insured).
- You have an active ergonomics program and you pretty much know what you're doing.
- You're considering implementing one or more ergonomics solutions to address specific problems (e.g., back and shoulder injuries from lifting).
- You'd like to evaluate a few different options.
- You're expecting a payback period of less than one year. (The payback period is the time that it takes for the benefits of a solution to pay for the costs of implementing it. Most ergonomics solutions have a payback period of less than one year.)

See the last page of this document for a more thorough list of assumptions for the calculator.

General Instructions:

Note: The Excel file uses macros to make the calculations. You may need to change your security settings in Excel (Tools...Options...Security tab) to allow macros in order for the spreadsheet to work properly.

Important: Save a back-up copy of the calculator before you make inputs. You should also save the calculator using a new name each time you use it. That way, if you accidentally delete one of the formulas, you will still have a fully functional copy in reserve.

You only need to input information into the boxes. Everything else will be calculated automatically.

Number of employees in this job/dept./org.:

Average hourly salary for these employees: per hour

Number of WMSD claims for this job/ dept./ org. per year:

This past year:

Type	Back strain	Number	<input type="text"/>	1
Type	Back strain	Number	<input type="text"/>	
Type	Back injury w/ surger	Number	<input type="text"/>	
Type	Neck strain	Number	<input type="text"/>	
Type	Shoulder strain	Number	<input type="text"/>	
Type	Rotator cuff injury	Number	<input type="text"/>	
Type	Elbow/forearm strain	Number	<input type="text"/>	
Type	Epicondylitis	Number	<input type="text"/>	
Type	Hand/wrist strain	Number	<input type="text"/>	Total c
Type	Hand/wrist tendinitis	Number	<input type="text"/>	
Type	Carpal tunnel syndrome	Number	<input type="text"/>	1
Type	All other MSDs	Number	<input type="text"/>	

The year before:

Type	Back strain	Number	<input type="text"/>	
Type	Back strain	Number	<input type="text"/>	
Type	Back strain	Number	<input type="text"/>	

Select appropriate options using drop down menus.

Move from one worksheet to the next using the tabs at the bottom of the screen.

2 years before:

Type	Back strain	Number	<input type="text"/>
Type	Back strain	Number	<input type="text"/>
Type	Back strain	Number	<input type="text"/>
Type	Back strain	Number	<input type="text"/>
Type	Back strain	Number	<input type="text"/>

Average annus
Estimated

Input Workers' Comp / Input Solutions / Benefits / Payback



Input only the number of employees who will be affected by the solutions you are considering. For example, you may have 12 total employees in your shipping department, but only 9 of them would use the lifting device you're considering.

	A	B	C	D	E	F	G
2				Number of employees in this job/dept./org.:			9
3				Average hourly salary for these employees:			\$12.00 per hour
4							
5				Number of WMSD claims for this job/ dept./ org. per year:			

Enter the average hourly salary for these employees. You don't need to type in the dollar sign. It will be formatted automatically. You will have to put in the decimal point if it's not a whole dollar amount (e.g., for \$14.50, type in 14.5).

Use the drop down menus to input the types of injuries that these workers have experienced. Select only the types of injuries that are likely to be reduced by the solutions you're considering.

Enter the number of each type of claim in these boxes.

These numbers will calculate automatically

Number of WMSD claims for this job/ dept./ org. per year:

This past year: Type Number Typical costs: \$ 17,446

Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Total costs for year: \$ 17,446

The year before: Type Number Typical costs: \$ 57,688

Type Number Typical costs: \$ 11,565

Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Total costs for year: \$ 69,253

2 years before: Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Type Number Typical costs: \$ -

Total costs for year: \$ -

Average annual WMSD claim costs: \$ 28,900

Typical costs: \$ 31,790

Each year can be any 12-month period. You must enter claims information for all three (3) years for the average costs to calculate correctly.

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You can input up to three different options you are considering. A typical option for comparison purposes is “do nothing,” which involves no costs of changes, but also has no benefits.

Option 2: ← Type the name of the option here

Purchase cost: \$

Engineering cost: ← Include costs to install, modify, etc.

Training cost: ← Include employee time off work when calculating training costs

Recurring costs: ← Annually recurring costs for maintenance, supplies, etc.

Other costs of change:

Total cost of intervention: \$ total co

- Eliminates exposure to hazard
- Reduces level of exposure ←
- Reduces time of exposure
- Relies on employee behavior
- No reduction in injuries expected

How effective will the solution be? For example, a mechanical device that lifts and moves the load will eliminate exposure to lifting hazards. A lift table that raises the load so that it can be lifted without bending will reduce the level of exposure. Job rotation reduces time of exposure. Safe lifting training and team lifting rely on employee behavior.

- High - speeds up entire process
- Medium - reduces wasted motion ←
- Low - improves comfort/reduces fatigue
- No productivity gains expected

Estimate the effect the option will have on productivity. When in doubt, use the more conservative estimate.

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	A	B	C	D	E	F	G	H	I
1									
2	Estimated benefits for solution options								
3									
4	Option 1 Job Rotation				Option 2 Pallet lift				
5		Reduction in claims:		15%		Reduction in claims:		40%	
6		Reduction in workers' comp costs:	\$	5,780		Reduction in workers' comp costs:	\$	11,560	
7		Reduction in indirect costs:	\$	6,358		Reduction in indirect costs:	\$	12,716	
8		Increase in productivity:	\$	-		Increase in productivity:	\$	9,180	
9		Other estimated savings:		<input type="text"/>		Other estimated savings:		<input type="text"/>	
10									
11		Total estimated annual savings:	\$	12,138		Total estimated annual savings:	\$	33,456	
12		Total estimated savings over 3 years:	\$	36,414		Total estimated savings over 3 years:	\$	100,367	
13		Total estimated savings over 5 years:	\$	60,689		Total estimated savings over 5 years:	\$	167,279	
14									
15									
16									

Estimated benefits from the solution options that you input are calculated automatically and presented on this worksheet. Total estimated annual savings are the potential savings the first year after implementing that solution option. Estimated savings over three and five year periods are also calculated. The cost of implementing the solution is not subtracted out (i.e., these are not net savings). Estimated net savings are shown on the 'Payback' tab.

Solution Effectiveness Estimates	
Type of Solution	Reduction in Claims
Eliminates exposure	70%
Reduces level of exposure	40%
Reduces time of exposure	15%
Relies on behavior	10%

Productivity Improvement Estimates	
Level of Increase	Percent Increase
High – speeds up process	10%
Medium – reduces wasted motion	5%
Low – improves comfort/fatigue	2.5%

ts Payback

	A	B	C	D	E	F	G	H	I	J	K	
2	Payback Period											
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	Option 1	Job Rotation	Option 2	Pallet lift	Option 3
Total first-year cost of control:	\$ 400		\$ 5,500		\$ -
Annually recurring costs:	\$ -		\$ -		\$ -
Estimated annual benefits:	\$ 12,138		\$ 33,456		\$ -
Estimated payback period:	0.03 years		0.16 years		- years
Estimated net benefits after one year:	\$ 11,738		\$ 27,956		\$ -
Estimated net benefits after 3 years:	\$ 36,014		\$ 94,867		\$ -
Estimated net benefits after 5 years:	\$ 60,289		\$ 161,779		\$ -

Option 1 payback period

Option 2 payback period

Option 3 payback period

Total costs, total benefits, and net benefits for the first year are shown on this tab. The payback period is calculated, and shown graphically for each option. Most ergonomic solutions have payback periods of less than one year. If you find a payback period that is significantly greater than one year, you should use a cost-benefit calculator that allows you to factor in depreciation and a discount rate.

If at any point you have questions, please contact Rick Goggins at ergonomics@LNI.wa.gov.

Assumptions for Basic Cost Benefit Calculator

Intended Use:

- Self-insured company.
- Implementing solution(s) in defined area (i.e., not a company-wide program).
- Company has active ergonomics program with all recommended elements and solutions will be effective.
- Can compare up to three options.
- Expecting payback in less than one year (i.e., not considering depreciation, discount rate).

Injury costs:

- Average costs from 2004 SHARP report on WMSDs.
- Average costs used instead of actual company costs because recent injuries may not have incurred eventual total cost of claim.
- Three years of experience used to be consistent with workers' comp.

Indirect costs:

- From OSHA e-tool: <http://www.osha.gov/SLTC/etools/safetyhealth/mod1.html>
- Less expensive claims have proportionally higher indirect costs.
- \$0 - \$2,999 = 4.5 x claim cost
- \$3,000 - \$4,999 = 1.6 x claim cost
- \$5,000 - \$9,999 = 1.2 x claim cost
- \$10,000+ = 1.1 x claim cost

Effectiveness of solutions:

- Based on Oxenburgh's (1991) assumptions & review of 250 case studies of ergonomics interventions.
- Effectiveness estimates were taken from the low end of the range to be conservative.
- Solutions that eliminate hazard (e.g., lift equipment, semi-automation) 70% effective.
- Solutions that reduce level of exposure (e.g., adjustable workstations, reduced weight of lift) 40% effective.
- Solutions that reduce time of exposure (e.g., job rotation) 15% effective.
- Solutions that rely on employee behavior (e.g., training only, team lifting) 10% effective.
- Percentage reduction in claims = percentage reduction in claims costs = percentage reduction in indirect costs.

Productivity benefits:

- Employers pay for 2,000 hours per year per worker, at \$x.xx per hour.
- Workers are not 100% productive, and may be only 85% productive or less under non-optimal work conditions.
- Ergonomics solutions can help to regain some of the lost 15% productivity by improving work conditions and increasing efficiency.
- Median increases in productivity for successful controls from the case studies in the 15% to 20% range, but how productivity measured not known, probably varies widely.
- Conservative estimates were chosen.
- High productivity increase – 10%, medium = 5%, low = 2.5%.
- Value of productivity equal to annual cost of worker salaries multiplied by percentage increase in productivity.

Oxenburgh, M. (1991). *Increasing productivity and profit through health and safety*. Australia: CCH International.