Pergamon

Journal of Safety Research - ECON proceedings 36 (2005) 237 – 240

www.elsevier.com/locate/jsr

www.nsc.org

Economic Evaluation Proceedings Paper

The potential-method—an economic evaluation tool

Monica Bergström

Finnish Institute of Occupational Health, Finland

Abstract

Introduction: Measuring the effect of safety and health on production is a difficult value to gauge. *Method:* This article introduces the Potential, which is an instrument for economic analysis that incorporates different changes in conditions. *Results:* While there are a number of problems associated with methods to determine these calculations, this method is a good indicator of the effects of safety and health and produces more than 300 variables with much less input. *Impact on Industry:* Organizations can use this method effectively to determine how safety and health measure can improve their bottom line. A positive business case is highlighted.

Keywords: Economic evaluation tools; Safety; Costs; Evaluation models

1. Introduction

The Potential is an instrument for economic analysis that is used when there are different changes in the working conditions. The Potential provides the opportunity to find a valid economical calculation with reasonable working efforts. The economic calculations are not particularly complicated, but the number of including factors makes it necessary to have a tool like the Potential to obtain the reliable economic analysis that is done with reasonable working efforts. The Potential counts with more than 300 variables. However, it only requires values of about 12 of these to obtain an economic analysis of a change in the working conditions.

The Potential model is based on a model that was developed by Maurice Oxenburgh in Australia. The method is now grounded on research by Professor Guy Ahonen from the Swedish School of Economics and Business Administration and Tuulikki Luopajärvi from the Finnish Institute of Occupational Health. The model was further developed together with William Strigård at Miljö-Data in Sweden. The available software has also been developed in Sweden (http://www.miljodata.se).

The model illustrates how changed working conditions that, for example, give lower employee turnover, reduced absence due to illness, or increased efficiency influence the production costs and change the productivity. The model assumes that the factual value of the work hour can be calculated by dividing the total labor cost of the company by the total number of efficient work hours per year. The total business economic benefit of any health and safety improvement is then the product of initial productive work hours and the reduction of average labor cost per productive work hours after the improvement.

The Intervention is described in the system as costs and effects. The effects can be, for example, reduced personnel turnover or changes in sick leave. The costs are investments and operation costs. The area of the rectangle (Fig. 1) is equivalent to the cost of production. The value depends on how much the production time can be sold for. The Potential values the production to the price it cost before some efforts were made.

2. The conceptual framework

Describing the effects of health and safety programs requires a conceptual framework. Such a framework offers

E-mail address: monica.bergstrom@ttl.fi.

0022-4375/$ - see front matter © 2005 National Safety Council and Elsevier Ltd. All rights reserved.
doi:10.1016/j.jsr.2005.06.005

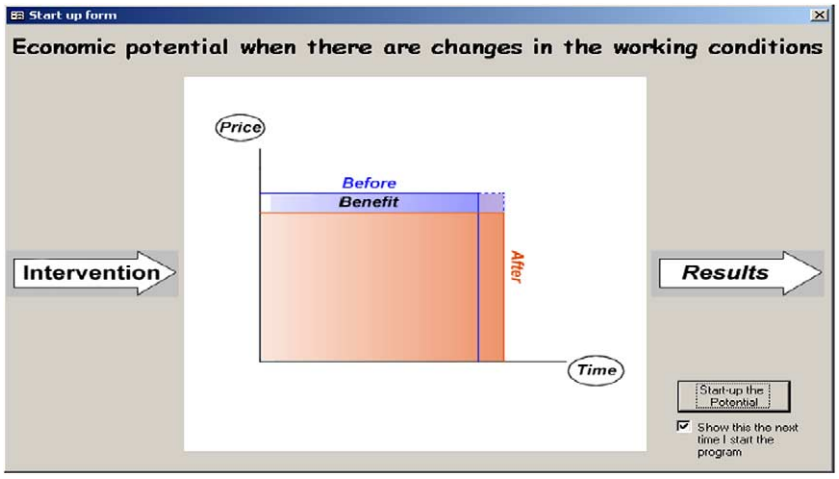

Fig. 1. The Potential –model.

an insight into the relationship between the process and outcomes of the development programs.

The conceptual framework for health and safety interventions has been developed by De Greef and Van den Broek (2004; Fig. 2).

3. Evaluation problems

One of the problems is that it is very difficult to establish the cause-effect relation. Often several measures and programs are initiated at the same time (not only health and safety actions but also other human resources actions), which makes it difficult to link a specific outcome to a specific measure.

The problem with evaluating the economic return of health and safety actions, in wider context workplace health promotion programs, is that small changes in the analytical procedure, the choice of variables, and the timeframe of the analysis are some of the factors that can markedly change the results of economic evaluations. The choice of technique often reflects value judgments and one could argue that when developing cost-benefit models it is best to take into account the relevant values of decision makers and stakeholders (Dudgill & Springett, 2001).

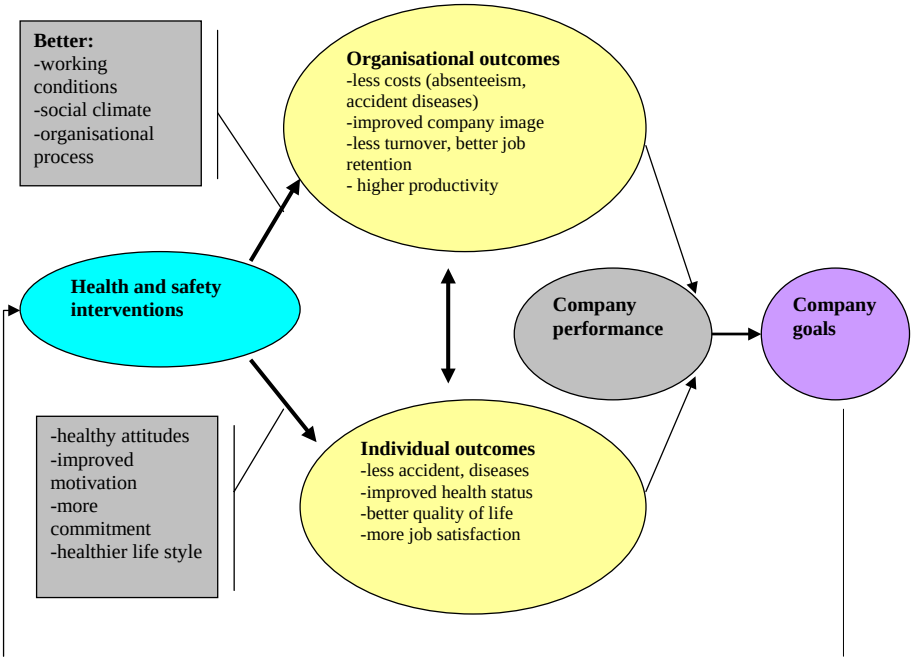

Fig. 2. The framework for describing arguments based on the effects and outcomes of health and safety interventions.

The measurement of effect is often based on "before-and-after" design, comparing the situation before the intervention with the situation after. Although this kind of analysis can offer evidence on the effectiveness, several dangers can be identified that threaten the internal validity (Robson, Schannon, Goldenhaar, & Hale, 2001). These dangers are:

- *History*: some other influential event(s) that could affect the outcome, occurs during the intervention
- *Instrumentation/reporting*: validity of measurement method changes over course of the intervention
- *Regression to the mean*: change in outcome measure might be explained by a group with one-time extreme value naturally changing toward the normal value
- *Testing*: taking measure (e.g., test) could have an effect on the outcome
- *Placebo*: intervention could have a nonspecific effect on outcome, independent of the key intervention component
- *Hawthorne*: involvement of outsiders could have an effect on outcome, independent of the key intervention component
- *Maturation*: intervention group develops in ways independent of the intervention (e.g., aging, increased experience), possibly affecting the outcome

Absenteeism figures have widely been used as surrogate for measuring productivity. The use of absenteeism data is logical because this data is widely available and closely linked with costs. Lowe (2003) states that absenteeism data cannot always be considered as valid data. Some of the problems he indicates are:

- not all absent employees are automatically nonproductive and not all employees present are automatically 100% productive
- the impact of absences varies depending on how the work is organized
- employers' records of absenteeism do not reflect informal practices in some workplaces, such as taking vacation days for family reasons
- absenteeism data is highly skewed because most employees are not absent at all while a relatively small number are frequently absent
- the problem of presenteeism: coming to work when sick or injured, resulting is not working full capacity

Listing problems on evaluating workplace health and safety programs may lead to the conclusion that setting up evaluation designs is unnecessary and not worth the effort. However, evaluation is an important element of the process. It brings the information necessary to monitor and measure the program performance in order to adjust program elements or introduce new elements.

4. The Business Case

The productivity of the workers is not an easy task in companies. Productivity is easily measured when there is something to measure, like machine output. The measurement of productivity is more complicated if

Table 1
The potential

THE POTENTIAL Example		
▪ metal industrial company with 60 workers (50 industrial workers and 10 office workers) ▪ lots of sick leaves because of musculoskeletal disorders ▪ lots of lifting and carrying in the job description ▪ two years developing project with participatory ergonomics ▪ the industrial workers worked in the working groups to find good solutions for the ergonomic changes ▪ all the workers used eight times a half day for the meetings and one day for each worker for the needed changes ▪ with the group meetings also the working climate and job attitudes and satisfaction increased. In addition the changes in the layout and work rotation the company bought two lifters (a′ 8,400 €), which depreciation period was three years. Cost of the capital was 7%. Effective period was two years (two years project). The sick leaves went down from 26 days/each to 14 days each. The productivity increase for the production line was 3%. Because of the sick leaves went down, the overtime work went also down from 200 hours to 50 hours.		
STANDARD VALUES		
-working hours/week	40	40
-working weeks/year	52	52
-non working days/year	8	8
-holiday additions-%	50	50
-indirect employee costs %	33	33
-sick leaves/compensation-% -9 days	100	100
NORMAL WORKING TIME		
-number of workers	60	60
SICK LEAVES		
-sick days/year	26	14
-number of occasions/year	5	4
-administration costs/case	15	15
HOLIDAYS		
-number of holidays/worker	30	30
-holiday addition-%	50	50
OTHER ABSENCE		
-midweek holidays/year *)	64	64
-other absence hour/year	0	40
WAGES		
-normal wage/hour	15	15
PRODUCTIVITY		
-productivity increase	3%	
-number of affected	50	
-utilization ratio	100%	
OVERTIME		
-overtime/worker/year	50	20
-cost of overtime/hour	25	25
INVESTMENTS		
-investments (lifters)	16400	
-operation costs/year	100	
-depreciation/year	3	
-effective period	2	
-cost of capital	7%	

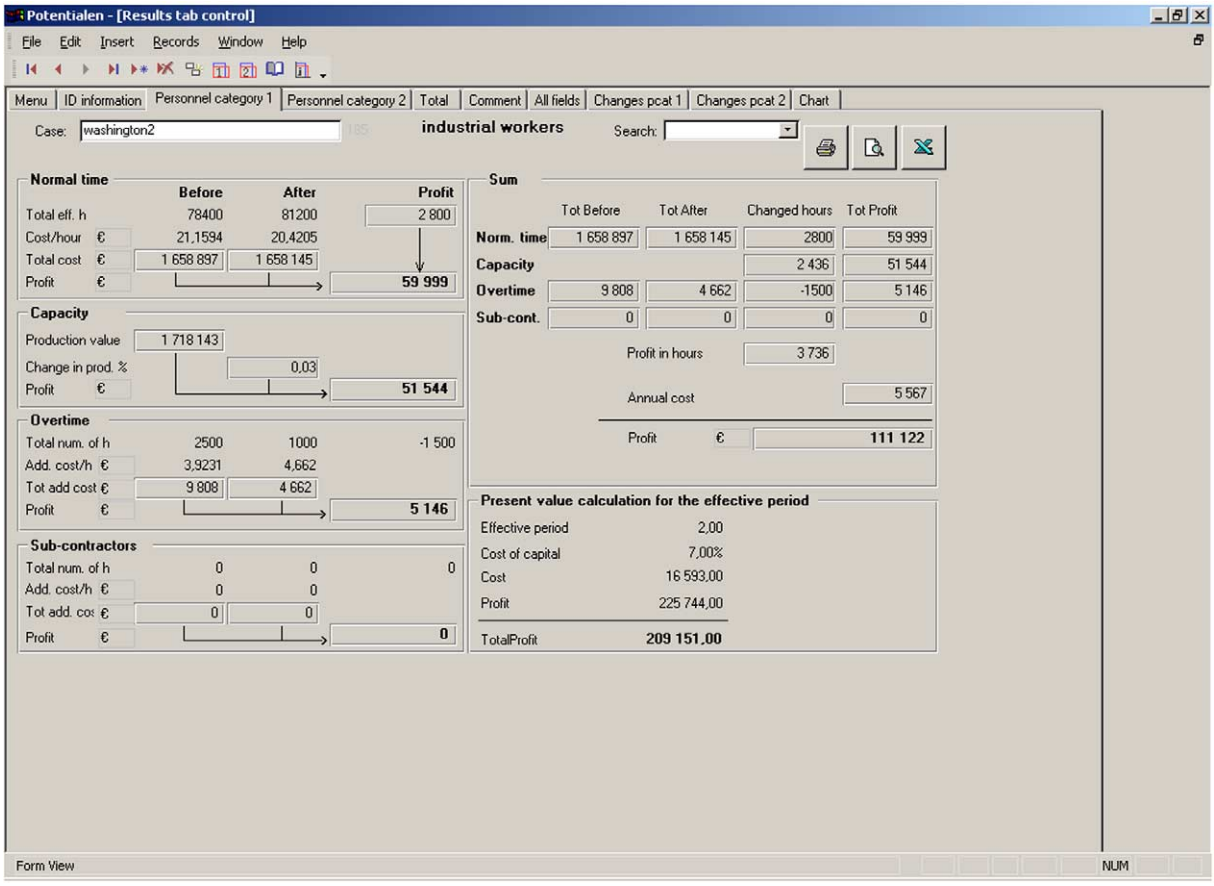

Fig. 3. The result of the case.

the measurable factors are related to human performance. The example of the calculation shows that the profit of this case is Euro 209,151 within two years (Table 1; Fig. 3).

5. Conclusion

The use of this economic evaluation tool showed a profit from implementing safety and health efforts and can be used for further analyses in other working conditions.

References

DeGreef, M., & Van den Broek, K. (2004). *Making the case for workplace health promotion. analysis of the effects on WHP*. Barcelonaz: ENWHP Report.

Dudgill, L., & Springett, J. (2001). *Evaluating health promotion programmes in the workplace. Evaluation in health promotion, priciples and perspectives*. Geneva: WHO.

Lowe, G. (2003). *Healthy workplace and productivity: a discussion paper*. Ottawa, Canada: Health Canada.

Robson, L., Schannon, H., Goldenhaar, L., & Hale, A. (2001). *Guide to evaluating the effectiveness of strategies for preventing work injuries*. Washington, DC: NIOSH.