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FOR ENGINEERING AND SCIENCE

PCs and Occupational Hazards

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Description

A new safety law requires that companies improve their working conditions if they employ more than 15 employees. Then, many businesses object, claiming that the costs would be too great. Questions regarding the potential impact of this legislation on the economy and whether claims of huge costs are true, are discussed in the article.

Body

Introduction

A state legislature considers a new safety law requiring all companies with 15 or more employees to provide adjustable chairs, "safe" video monitors, detachable keyboards, and 15-minute breaks every two hours for all employees spending a minimum of three hours per day working on a personal computer or workstation (PC/WS).1

Businesses have objected, however. They claim that in one study alone, conducted on a similar law in a major U.S. city, such legislation cost $100 million to update 56,000 PCs.2

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Numerical and/or Design Problems

1. Describe an estimation method you would use to determine the validity of the $100 million estimate. Indicate which assumptions you would retain and which values could be variable. Given your assumptions, is the original prediction accurate?
2. Additional conservative predictions claim 10% of the 100,000 small businesses in the state with 15 employees or less would be put out of business by this legislation.
3. You are an industrial engineer working on an economic impact statement for the governor's task force dealing with this proposed legislation and you need to come up with some estimates. [Note that expected value and the expected value of perfect information (EVPI) could be of help in making a "first cut" estimate.] What analysis would you do to describe the costs of such legislation? Show all your assumptions, calculations, and write up a memo describing to the governor what you would recommend.

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Questions on Ethics and

Professionalism

1. What is the legislature's responsibility in determining the economic impact? What about PC/WS manufacturers in developing safer machines? Why are computers today "safer" than they were in 1991? Are they?
2. Suppose you are an electrical engineer working for a PC manufacturer in the state. What are the ethical considerations needed to do a cost/benefit analysis with respect to this issue?
3. Make a table of the pros and cons in redesigning the PC company's machines to address these health issues (real and/or imagined). (See footnote 3 as well.)

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Solutions to Numerical Problems

1. One possible estimate be obtained like this (this example is certainly not unique):
    1. Assume 1 person per PC or workstation.
    2. Assume the average small business of 15 persons has from 3 to 10 people who work on computers at least 3 hours per day.
    3. Assume the cost to the state for each lost business to average $100,000 per year over a five year period. Is this a reasonable number?

    $100 million/56K ~ $2,000 per PC/WS. It is not difficult to find ergonomic tables, chairs, etc. which in addition to other costs would plausibly add 50% to the $4,000 cost of machines in 1991 dollars.

2. The estimate is reasonable, albeit very expensive. As PC/WS costs have come down other external furniture, etc. costs have stabilized (or gone up), this law could not double the cost at least for PCs!

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Appendices, Attachments, and

Bibliography

- 1. "San Francisco PC Safety Law Raises More Questions than it Answers", *PC Computing,* April, 1991.
- 2. Ibid. This article was first pointed out to the author and summarized by Taylor University computer science majors, Marla Butch and Geof Baker.
- 3. Sellers, Don. *ZAP!* Edited by Stephen F. Roth. Peachpit Press, 1994.

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Notes

These problems were originally developed as part of an NSF-funded project to create numerical problems that raise ethical issues for use in engineering and other course assignments. The problems presented here have been edited slightly for clarity.

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