

The Return on Investment (ROI) for Human Factors & Ergonomics Initiatives

Eric F. Shaver, Ph.D. & Curt C. Braun, Ph.D.

www.benchmarkrs.com

In the business world, benefits are often judged by their return on investment (ROI) – the ratio of the profit gained or lost relative to the cost of achieving the profit. According to Wilson and Rosenbaum (2005), there are three categories of return on investment (ROI): internal, external, and social. Internal ROI refers to benefits that save the organization money when developing products or services. This can take the form of decreased development costs, preventing the need for redesign, and reduced time in getting the product to market. External ROI refers to benefits that increase the profitability of products or services by making them better for the customer. This can take the form of increased sales, increased market share, decreased customer support and service costs, decreased return rate, and improved user experience. It should be noted that Internal ROI typically must be demonstrated before External ROI can be realized. Social ROI refers to the perception that human factors & ergonomics initiatives are beneficial and can affect both Internal and External ROI. Internal Social ROI includes the perception of stakeholders that a given initiative provides a benefit, which in turn, increases management “buy in.” External Social ROI consists of customer’s positive perceptions of the organization due to past satisfactory experiences and demonstrated trustworthiness, which leads to improved branding and strengthened corporate image.

A common way to determine the benefit of a given human factors & ergonomics initiative is by performing a cost-benefit analysis. The results of a cost-benefit analysis can guide where an organization can best invest their financial resources, thus maximizing their return on investment (ROI).

There is a growing body of literature that demonstrates a positive return on investment (ROI) for implementing human factors & ergonomics initiatives. Case studies have demonstrated the benefits for many technologies, processes, and industries, including:

- Websites (Bias & Mayhew, 2005)
- Software (Bias & Mayhew, 2005)
- Computers (Beevis, 2003; Nielson, 1993)
- Intranets (Kerr, et al., 2008)
- Electronics (Hendrick, 1996; Sen & Yeow, 2003)
- Office ergonomics (Goggins, et al., 2008)
- Workplace ergonomics / manual material handling (Hendrick, 1996; Lahiri, et al., 2005; Maudgalya, et al., 2008; Rodrigues, 2001)
- Industrial production lines (Stanton & Baber, 2003)
- Forestry (Hendrick, 1996)
- Automotive (Stanton & Baber, 2003)
- Aircraft (Hendrick, 1996)

- Petroleum (Hendrick, 1996)
- Healthcare (Goggins, et al., 2008)
- Nuclear (Kirwan, 2003) and electrical power plants (Seeley & Marklin, 2003)

Specific benefits for human factors & ergonomics initiatives include:

- Assembly job redesign: 10.76% first year ROI & 30.10% subsequent year ROI (Lyon, 1997)
- Workstation redesign: 15% increase in productivity (Hendrick, 2003)
- Robotic case palletizer: 17% ROI over a 10 year period (Rodrigues, 2001)
- Log truck redesign: \$6900 investment & \$65,000 return = 1:9.4 first year cost-benefit ratio (Hendrick, 2008)
- Electric utility tool replacement: \$300,000 capital investment paid back in 4 months (Seeley & Marklin, 2003)
- Motherboard redesign: \$581,495/year factory savings & \$142,105/year customer savings (Sen & Yeow, 2003)
- Computer usability: 200% – 500% return on a 6% budget investment (Nielson, 1993)

These benefits arise by increasing and decreasing cost related aspects of the development, manufacturing, distribution, sales and support activities. These increases and decreases include those shown below.

Increased

- Ease of use
- Ease of learning
- Satisfaction, trust, & loyalty
- Repeat purchases
- Purchase recommendation
- Safety & health
- Productivity & work quality
- Satisfaction & commitment
- Sales & market share
- Stock value
- Brand recognition

Decreased

- Accidents, injuries & illnesses
- Lost workdays
- Error rates
- Training time
- Absenteeism & turnover
- Development costs
- Need for redesign & recall
- Support & service costs
- Labor costs
- Equipment damage
- Maintenance costs
- Insurance rates

References

- Beevis, D. (2003). Ergonomics – Costs and Benefits Revisited. *Applied Ergonomics*, 34, 491-496.
- Bias, R.G., & Mayhew, D.J. (2005). *Cost-justifying usability: An update for the internet age*. San Francisco, CA: Morgan Kaufman Publishers.
- Goggins, R.W., Spielholz, P., & Nothstein, G.L. (2008). Estimating the effectiveness of ergonomics interventions through case studies: Implications for predictive cost-benefit analysis. *Journal of Safety Research*, 39, 339-344.
- Hendrick, H.W. (1996). The ergonomics of economics is the economics of ergonomics. *Proceedings of the Human Factors and Ergonomics Society*, 40, 1-10.
- Hendrick, H.W. (2003). Determining the cost-benefits of ergonomics projects and factors that lead to their success. *Applied Ergonomics*, 34, 419-427.
- Hendrick, H.W. (2008). Applying ergonomics to systems: Some documented “lessons learned.” *Applied Ergonomics*, 39, 418-426.
- Kerr, M.P., Knott, D.S., Moss, M.A., Clegg, C.W., & Horton, R.P. (2008). Assessing the value of human factors initiatives. *Applied Ergonomics*, 39, 305-315.
- Kirwan, B. (2003). An overview of a nuclear reprocessing plant human factors programme. *Applied Ergonomics*, 34, 441-452.
- Lahiri, S., Markkanen, P., & Levenstein, C. (2005). The cost effectiveness of occupational health interventions: Preventing occupational back pain. *American Journal of Industrial Medicine*, 48, 515-529.
- Lyon, B.K. (1997, March). Ergonomic benefit/cost analysis: Communicating the value of enhancements. *Professional Safety*, 33-36.
- Maudgalya, T., Genaidy, A., & Shell, R. (2008). Productivity-quality-costs-safety: A sustained approach to competitive advantage – a systematic review of the national safety council’s case studies in safety and productivity. *Human Factors and Ergonomics in Manufacturing*, 18, 152-179.
- Nielsen, J. (1993). *Usability Engineering*. San Diego, CA: Academic Press.
- Rodrigues, C.C. (2001, April). Ergonomics to the rescue: A cost-justification case study. *Professional Safety*, 32-34.
- Seeley, P.A., & Marklin, R.W. (2003). Business case for implementing two ergonomic interventions at an electric power utility. *Applied Ergonomics*, 34, 429-439.
- Sen, R.N., & Yeow, R.H.P. (2003). Cost effectiveness of ergonomic redesign of electronic motherboard. *Applied Ergonomics*, 34, 453-463.
- Stanton, N.A., & Baber, C. (2003). On the cost-effectiveness of ergonomics. *Applied Ergonomics*, 34, 407-411.
- Wilson, C.E., & Rosenbaum, S. (2005). Categories of return on investment and their practical implications. In R.G. Bias and D.J. Mayhew (Eds.), *Cost-Justifying Usability: An Update for the Internet Age* (pp. 215-263). San Francisco, CA: Morgan Kaufman Publishers.

Eric F. Shaver, Ph.D. is a senior consultant with Benchmark Research & Safety, Inc., where he specializes in human factors & ergonomics, safety, and applied decision making. Dr. Shaver's work has emphasized achieving a good fit between people and technology, to facilitate their safety, performance, and satisfaction.

Curt C. Braun, Ph.D. is the president, CEO, and founder of Benchmark Research & Safety, Inc. Dr. Braun has brought psychological and human factors principles to a variety of industries, including aviation, software development, public administration and research, and wildland management. In each field, Dr. Braun has worked to identify and shape the psychological and system design factors that promote human performance.

Benchmark Research & Safety, Inc. specializes in providing consulting and professional services for a variety of areas including human factors design & usability, product & occupational safety, and training. For more information about how human factors & ergonomics initiatives might benefit your organization, please contact Dr. Shaver at eshaver@benchmarkrs.com or 208-407-2908.