

## A systems approach to measuring return on investment for HRD interventions

Greg G. Wang, Zhengxia Dou, Ning Li

First published: 28 May 2002

<https://doi.org/10.1002/hrdq.1024>

Citations: 63

### Abstract

This study contributes to the limited methodological literature on HRD program evaluation and measurement. The study explores an interdisciplinary approach for return on investment (ROI) measurement in human resource development (HRD) research and practices. On the basis of a comprehensive review and analysis of relevant studies in economics, industrial-organizational psychology, financial control, and HRD fields, we developed a systems approach to quantitatively measure ROI for HRD programs. The ROI concept for HRD field was defined, and a theoretical systems framework was developed. The applicability of using statistical and mathematical operations to determine ROI and isolate non-HRD program impacts is discussed. Application scenarios are presented to demonstrate the utility of the systems approach in real-world ROI measurement for HRD interventions.

### References

Allbee, K. E., & Semple, C. A. (1980). Aircrew training device life-cycle cost and worth of ownership. (CRG TR-3041E). Westlake Village, CA: Canyon Research Group.

[Google Scholar](#)

Alliger, G. M., & Janak, E. A. (1989). Kirkpatrick's levels of training criteria: Thirty years later. *Personnel Psychology*, 42 (2), 331-342.

[Web of Science®](#) | [Google Scholar](#)

Bakken, D., & Bernstein, A. L. (1982). A systematic approach to evaluation. *Training and Development Journal*, 36 (8), 44-51.

[Web of Science®](#) | [Google Scholar](#)

Barron, J. M., Berger, M. C., & Black, D. D. (1993). Do workers pay for on-the-job training? (Working paper no. E-169-93). Lexington: University of Kentucky.

[Google Scholar](#)

---

Barron, J. M., Berger, M. C., & Black, D. D. (1997). How well do we measure training? *Journal of Labor Economics*, *15*, 507-528.

[Web of Science®](#) | [Google Scholar](#)

---

Becker, G. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, *70* (suppl. 5), part 2, S9-S49.

[CAS](#) | [Web of Science®](#) | [Google Scholar](#)

---

Becker, G. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. New York: Columbia University Press.

[Google Scholar](#)

---

Ben-Porath, Y. (1967). The production of human capital and the life cycle of earnings. *Journal of Political Economy*, *75*, 352-365.

[Web of Science®](#) | [Google Scholar](#)

---

Bertalanffy, L. (1968). *General system theory: Foundations, development, and applications*. New York: Braziller.

[Google Scholar](#)

---

Bishop, J. (1991). On the job training of new hires. In D. Stern (Eds.), *Market failure in training? New economic analysis and evidence on training of adult employees*. New York: Springer-Verlag.

[Web of Science®](#) | [Google Scholar](#)

---

Bobko, P., & Russell, C. (1991). A review of the role of taxonomies in human resources management. *Human Resource Management Review*, *4*, 293-316.

[Google Scholar](#)

---

Boudreau, J. W. (1991). Utility analysis for decisions in human resource management. In M. D. Dunnette (Eds.), *Handbook of Industrial and Organizational Psychology* (2nd ed., vol. 2, pp. 621-745). Palo Alto, CA: Consulting Psychologists Press.

[Google Scholar](#)

Brandenburg, D. (1982). Training evaluation: What's the current status? *Training and Development Journal*, 36, 14–19.

[Web of Science®](#) | [Google Scholar](#) |

---

Brogden, H. E. (1946). On the interpretation of the correlation coefficient as a measure of predictive efficiency. *Journal of Educational Psychology*, 37, 64–76.

[Google Scholar](#) |

---

Brogden, H. E. (1949). When testing pays off. *Personnel Psychology*, 2, 171–183.

[Web of Science®](#) | [Google Scholar](#) |

---

Brogden, H. E., & Taylor, E. K. (1950). The dollar criterion: Applying the cost accounting concept to criterion construction. *Personnel Psychology*, 3, 133–154.

[Web of Science®](#) | [Google Scholar](#) |

---

Browning, R. F., Ryan, L. E., Scott, P. G., & Smode, A. F. (1977). Training effectiveness evaluation of device 2F 87F, P-3C operational flight trainer. (TAEG report no. 42.). Orlando: Training Analysis and Evaluation Group.

[Google Scholar](#) |

---

Cascio, W. F. (1992). Assessing the utility of selection decisions: Theoretical and practical considerations. In N. Schmitt (Eds.), *Personnel selection in organizations*. San Francisco: Jossey Bass.

[Google Scholar](#) |

---

Cascio, W. F. (2000). *Costing human resources: The financial impact of behavior in organizations*. (4th ed.). Cincinnati: South-Western.

[Google Scholar](#) |

---

Cronbach, O. L., & Gleser, G. G. (1965). *Psychological tests and personnel decisions*. (2nd ed.). Urbana: University of Illinois Press.

[Google Scholar](#) |

---

Dearden, J. (1969). The case against ROI control. *Harvard Business Review*, 47, 124–134.

[Web of Science®](#) | [Google Scholar](#) |

---

Dickinson, K. P., Johnson, T. R., & West, R. W. (1987). An analysis of the sensitivity of quasi-experimental net impact estimates of CETA programs. *Evaluation Review*, 11, 452–472.

[Web of Science®](#) | [Google Scholar](#) |

---

Doppelt, J. E., & Bennett, G. K. (1953). Reducing the cost of training satisfactory workers by using tests. *Personnel Psychology*, 6, 1-8.

[Web of Science®](#) | [Google Scholar](#) |

---

Douglas, P. H. (1934). *The theory of wages*. New York: Crowell-Collier & Macmillan.

[Google Scholar](#) |

---

Ehrbar, A. (1998). *EVA: The real key to creating wealth*. New York: Wiley.

[Google Scholar](#) |

---

Ehrenberg, R., & Smith, R. (1994). *Modern labor economics: theory and public policy*. ( 5th ed.). New York: HarperCollins.

[Google Scholar](#) |

---

Feuer, M., Glick, H., & Desai, A. (1987). Is firm-sponsored education viable? *Journal of Economic Behavior and Organization*, 8, 121-136.

[Web of Science®](#) | [Google Scholar](#) |

---

Fitz-enz, J. (1984). *How to measure human resources management*. New York: McGraw-Hill.

[Google Scholar](#) |

---

Fraker, T., & Maynard, R. (1987). The adequacy of comparison group designs for evaluations of employment-related programs. *Journal of Human Resources*, 22, 194-227.

[Web of Science®](#) | [Google Scholar](#) |

---

Friedlander, D., & Robins, P. (1991). Estimating the effects of employment and training programs: Assessment of some nonexperimental techniques. New York: Manpower Demonstration Research.

[Google Scholar](#) |

---

Fusch, G. E. (2001). What happens when the ROI model does not fit? *Performance Improvement Quarterly*, 14 (4), 60-76.

[Google Scholar](#) |

---

Geroy, G., & Swanson, R. (1984). Forecasting training costs and benefits in industry. *Epsilon Pi Tau*, 10, 15-19.

[Google Scholar](#) |

---

Gilbert, T. (1978). *Human competence: Engineering worthy performance*. New York: McGraw-Hill.

[Google Scholar](#)

---

Gujarati, D. N. (1988). *Basic econometrics*. (2nd ed.). New York: McGraw-Hill.

[Google Scholar](#)

---

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*, 286–293.

[Google Scholar](#)

---

Heckman, J. J., & Hotz, V. J. (1989). Choosing among alternative nonexperimental methods for estimating the impact of social programs: The case of manpower training. *Journal of American Statistical Association*, *84* (408), 862–874.

[Web of Science®](#) | [Google Scholar](#)

---

Heckman, J. J., Hotz, V. J., & Dabos, M. (1987). Do we need experimental data to evaluate the impact of manpower training on earnings? *Evaluation Review*, *11*, 395–427.

[Web of Science®](#) | [Google Scholar](#)

---

Holton, E. F. (1996). The flawed four-level evaluation model. *Human Resource Development Quarterly*, *7*, 5–21.

[Google Scholar](#)

---

Hotz, V. J. (1992). Designing and evaluation of the Job Training Partnership Act. In C. F. Manski (Eds.), *Evaluating welfare and training programs*. Cambridge, MA: Harvard University Press.

[Web of Science®](#) | [Google Scholar](#)

---

Jacobs, R. L., Jones, M. J., & Neil, S. (1992). A case study in forecasting the financial benefits of unstructured and structured on-the-job training. *Human Resource Development Quarterly*, *3*, 133–139.

[Google Scholar](#)

---

Judge, G., Hill, R., Griffiths, W., Lutkepohl, H., & Lee, T. (1988). *Introduction to the theory and practice of econometrics*. (2nd ed.). New York: Wiley.

[Google Scholar](#)

---

Kachigan, S. K. (1986). *Statistical analysis: An interdisciplinary introduction to univariate and multivariate methods*. New York: Radius Press.

[Google Scholar](#)

---

Kaufman, B. E. (1994). *The economics of labor markets*. ( 4th ed.). Fort Worth: Dryden Press.

[Google Scholar](#)

---

Kaufman, R., & Keller, J. M. (1994). Levels of evaluation: Beyond Kirkpatrick. *Human Resource Development Quarterly*, 5, 371–380.

[Google Scholar](#)

---

Kirkpatrick, D. (1959). Techniques for evaluating training programs. *Journal of the American Society for Training and Development*, 13, 3–9.

[Google Scholar](#)

---

Kirkpatrick, D. (1967). Evaluation of training. In R. Craig (Eds.), *Training and development handbook*. New York: McGraw-Hill.

[Google Scholar](#)

---

Kirkpatrick, D. (1977). Evaluating training programs: Evidence vs. proof. *Training & Development Journal*, 31, 9–12.

[Web of Science®](#) | [Google Scholar](#)

---

Kirkpatrick, D. (1983). Four steps to measuring training effectiveness. *Personnel Administrator*, 28, 19–25.

[Google Scholar](#)

---

Kirkpatrick, D. (1998). *Evaluating training programs: The four levels*. ( 2nd ed.). San Francisco: Berrett-Koehler.

[Google Scholar](#)

---

Koehle, D. A. (2000). Investing in workforce training improves financial success. *Training & Development*, 54, 73–74.

[Google Scholar](#)

---

Koontz, H., O'Donnell, C., & Weihrich, H. (1984). *Management*. ( 8th ed.). New York: McGraw-Hill.

[Google Scholar](#)

LaLonde, R. (1986). Evaluating the econometric evaluations of training programs with experimental data. *American Economic Review*, *76*, 604–620.

[Web of Science®](#) | [Google Scholar](#) |

---

LaLonde, R., & Maynard, R. A. (1987). How precise are evaluations of employment and training programs? Evidence from a field experiment. *Evaluation Review*, *11*, 428–451.

[Web of Science®](#) | [Google Scholar](#) |

---

Latham, G. P., & Whyte, G. (1994). The futility of utility analysis. *Personnel psychology*, *47*, 31–46.

[Web of Science®](#) | [Google Scholar](#) |

---

Law, K. S., & Myors, B. (1999). A modification of Raju, Burke, and Normand's (1990) new model for utility analysis. *Asia Pacific Journal of Human Resources*, *37*, 39–51.

[Google Scholar](#) |

---

Maddala, G. S. (1983). *Limited-dependent and qualitative variables in econometrics*. New York: Cambridge University Press.

[Google Scholar](#) |

---

Mathieu, J. E., & Leonard, R. L., Jr. (1987). Applying utility concepts to a training program in supervisory skills: A time-based approach. *Academy of Management Journal*, *30*, 316–335.

[Web of Science®](#) | [Google Scholar](#) |

---

Maynard, R. (1994). Methods for evaluating employment and training programs: Lessons from the U.S. experience. In R. McNabb (Eds.), *The market for training: International perspectives on theory, methodology and policy*. Brookfield, VT: Ashgate.

[Google Scholar](#) |

---

McLagan, P. (1989). *The models*. Alexandria, VA: American Society for Training and Development.

[Google Scholar](#) |

---

McLinden, D., & Trochim, W. (1998). Getting to parallel: Assessing the return on expectations of training. *Performance Improvement Journal*, *37*, 21–25.

[Google Scholar](#) |

---

Mincer, J. (1962). On-the-job training: Costs, returns, and some implications. *Journal of Political Economy*, *70*, part 2, S50–S79.

[Web of Science®](#) | [Google Scholar](#) |

---

Mincer, J. (1994). Investment in U.S. education and training: Levels and changes since the 1960s. (Working paper no. 4844.). Cambridge, MA: National Bureau of Economic Research.

[Google Scholar](#) |

---

Moffitt, R. (1991). Program evaluation with nonexperimental data. *Evaluation Review*, 15, 291–314.

[Web of Science®](#) | [Google Scholar](#) |

---

Myers, R. (1996). Metric wars. *CFO*, 12, 41–50.

[Google Scholar](#) |

---

Naylor, J. C., & Shine, L. C. (1965). A table for determining the increase in mean criterion score obtained by using a selection device. *Journal of Industrial Psychology*, 3, 33–42.

[Web of Science®](#) | [Google Scholar](#) |

---

Neter, J., Wasserman, W., & Kutner, M. H. (1990). *Applied linear statistical models: Regression, analysis of variance, and experimental designs*. Boston: Irwin.

[Web of Science®](#) | [Google Scholar](#) |

---

Nicholson, W. (1990). *Microeconomic theory: Basic principles and extensions*. ( 5th ed.). Fort Worth: Dryden Press.

[Google Scholar](#) |

---

Nikbakht, E., & Groppelli, A. (1990). *Finance*. ( 2nd ed.). Barron's Educational Series.

[Google Scholar](#) |

---

O'Neill, D. (1973). *The federal government and manpower*. Washington, D.C.: American Enterprise Institute.

[Google Scholar](#) |

---

Parsons, D. (1990). The firm's decision to training. In R. Ehrenberg (Ed.), *Research in Labor Economics*, vol. 2. Greenwich, CT: JAI Press.

[Google Scholar](#) |

---

Perry, C. (1975). *The impact of government manpower programs*. Philadelphia: University of Pennsylvania.

[Google Scholar](#) |

---

J. Phillips (Ed.). (1994). *In action: Measuring return on investment*, vol. 1. Alexandria, VA: ASTD.

[Google Scholar](#)

---

Phillips, J. (1997a). *Handbook of training evaluation and measurement methods*. ( 3rd ed.). Houston: Gulf.

[Google Scholar](#)

---

Phillips, J. (1997b). *Return on investment in training and performance improvement programs*. Houston: Gulf.

[Google Scholar](#)

---

Pritchard, R. D. (1992). Organizational productivity. In M. D. Dunnette (Eds.), *Handbook of industrial and organizational psychology*. ( 2nd ed.). Palo Alto, CA: Consulting Psychologists Press.

[Google Scholar](#)

---

Raju, N. S., Burke, M. J., & Normand, J. (1990). A new approach for utility analysis. *Journal of Applied Psychology*, *75*, 3-12.

[Web of Science®](#) | [Google Scholar](#)

---

Rothwell, W., & Sredl, H. (1992). *The ASTD reference guide to professional human resource development roles and competencies*. ( 2nd ed.). Amherst, MA: HRD Press.

[Web of Science®](#) | [Google Scholar](#)

---

Schmidt, F. L., Hunter, J. E., & Pearlman, K. (1982). Assessing the economic impact of personnel programs on workforce productivity. *Personnel Psychology*, *35*, 333-347.

[Web of Science®](#) | [Google Scholar](#)

---

Schmidt, F. L., Hunter, J. E., McKenzie, R. C., & Muldrow, T. W. (1979). Impact of valid selection procedures on work-force productivity. *Journal of Applied Psychology*, *64*, 609-626.

[Web of Science®](#) | [Google Scholar](#)

---

Searby, F. W. (1975). Return to return on investment. *Harvard Business Review*, *53*, 113-119.

[Web of Science®](#) | [Google Scholar](#)

---

Stewart, G. B., & Stern, J. M. (1991). *The quest for value: the EVA management guide*. New York: Harper Business.

---

Stigler, G. J. (1950). The development of utility theory. *Journal of Political Economy*, 59 part 1, 307-327;

The development of utility theory. *Journal of Political Economy*, 59 part 2, 373-396.

---

Sturm, R. (1993). *How do education and training affect a country's economic performance? A literature survey*. Santa Monica, CA: RAND.

---

Swanson, R. A. (1992). Demonstrating financial benefits to clients. In H. D. Stolovitch (Eds.), *Handbook of human performance technology*. San Francisco: Jossey-Bass.

---

Swanson, R. A., & Gradous, D. B. (1988). *Forecasting financial benefits of human resource development*. San Francisco: Jossey-Bass.

---

Swanson, R. A., & Holton, E. F. (2001). *Foundations of human resource development*. San Francisco: Berrett-Koehler.

---

Taylor, H. C., & Russell, J. T. (1939). The relationship of validity coefficients to the practical effectiveness of tests in selection. *Journal of Applied Psychology*, 23, 565-578.

---

Thode, W. F., & Walker, R. A. (1983). A model for comparing training costs in a complex military training system. (NPRDC technical report EA 015809.). San Diego: Navy Personnel Research and Development Center.

---

Wang, G. (1997). Private sector training in the United States: Behaviors and characteristics. Unpublished doctoral dissertation, Pennsylvania State University, State College.

---

Wang, G. (2000, May). Training economics: An alternative approach to measuring ROI for HRD programs. American Society for Training and Development (ASTD) International Conference, Dallas.

[Google Scholar](#)

Wang, G. (2002). Control group methods for HPT program evaluation and measurement. *Performance Improvement Quarterly*, 15 (2), forthcoming.

[Google Scholar](#)

Wolf, M. G. (1991). Review of costing human resources: The financial impact of behavior in organizations. *Personnel Psychology*, 45, 881–882.

[Google Scholar](#)

Yan, J. (2000, Apr. 16). Personal contact. Pan American Health Organization, World Health Organization.

[Google Scholar](#)

Citing Literature



[Download PDF](#)

## ABOUT WILEY ONLINE LIBRARY

[Privacy Policy](#)

[Terms of Use](#)

[About Cookies](#)

[Manage Cookies](#)

[Accessibility](#)

[Wiley Research DE&I Statement and Publishing Policies](#)

[Developing World Access](#)

## HELP & SUPPORT

[Contact Us](#)

[Training and Support](#)

[DMCA & Reporting Piracy](#)

## OPPORTUNITIES

[Subscription Agents](#)

[Advertisers & Corporate Partners](#)

## CONNECT WITH WILEY

[The Wiley Network](#)

Copyright © 1999-2025 John Wiley & Sons, Inc or related companies. All rights reserved, including rights for text and data mining and training of artificial intelligence technologies or similar technologies.

**WILEY**