

Documenting and sharing macroergonomic success stories: nearly two decades of good ergonomics

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1. Introduction

In his famous presidential address to the US Human Factors and Ergonomics Society, Hal Hendrick (1996) claimed that “good ergonomics is good economics” and defended this point with 25 case studies showing the business value of ergonomic interventions. He then urged others to follow his lead: “We, the professional human factors/ergonomics community, must better document the costs and benefits of our efforts and proactively share these data with our colleagues, business decision makers, and government policymakers” (Hendrick, 1996, p.14). Nearly two decades have passed since Hendrick’s address, spurring us to reflect on two questions: (1) What impact have human factors/ergonomics and macroergonomics in particular had worldwide over the past twenty years? (2) How well has the discipline analyzed, documented, and shared its “successes”?

2. Methods

Five macroergonomics researchers and practitioners, representing different nations, application domains, and perspectives were invited to (a) share cases of macroergonomic success, broadly defined, and (b) comment on the methods and challenges related to measuring and disseminating information about the impact of human factors/ergonomics.

3. Results

Many case studies speak to the potential impact of macroergonomics. For example:

Case Study 1. A macroergonomics intervention on knowledge worker’s health and performance was conducted employing a longitudinal quasi-experimental study design to assess the impact of the intervention. A Systems Analysis Tool was used to actively engage workers in the design process, resulting in a solution that integrated ergonomic principles with increased control over the work environment for individual workers and teams. The findings of this study showed that optimizing workspace design to support group and individual work, and providing ergonomics training significantly improved business process efficiency, psychosocial work environment and musculoskeletal health among knowledge workers (Robertson et al., 2008).

Case Study 2. We had several projects together with a German health insurance company to introduce Corporate Health Management (CHM) and to measure the success of the introduction. In one project 30 industrial companies took part. There have been several interventions like integration of health in the company's mission statement, having health improvements as targets for superiors, organizing health circles to include employees etc. The measurement was done with the European Excellence Model which has been transferred to health aspects. This includes among others objective and subjective data like the results of an employee survey. There are other examples like introducing new technologies, improving the rehabilitation quality in workshops for disabled people or looking at working conditions in international supply chains to improve these conditions and at the same time contribute to the reduction of risks in a company.

Case Study 3. A macroergonomics approach was successfully used for the design and implementation of smart infusion pump technology in a hospital (Carayon et al., 2010). We used the SEIPS (Systems Engineering Initiative for Patient Safety) model (Carayon et al., 2006) (that incorporates the macroergonomic work system model of Smith and Carayon (1989)) and provided recommendations for the design and implementation of the technology, such as improved design of the pump's drug library and focused training on specific pump features (e.g., inserting tubing in pump). This facilitated the integration of the infusion pump technology in nursing workflow and enhanced nurses' acceptance of the technology over time.

4. Discussion and Conclusion

Critically examining the notion of "macroergonomic success" raises questions about definitions, trade-offs, methods, inferences, and ultimately, future directions. E.g.,

- An irony of successful macroergonomic initiatives is the difficulty of isolating the "ergonomic contribution" to success among comprehensive interventions.
- Methodological challenges include comparing cost and benefit values calculated on different scales (e.g., monetary cost vs. wellbeing vs. ecological impact); isolating the value of specific interventions among large scale, longitudinal, and multipart change efforts; measuring impact from the perspective of multiple stakeholders; and difficulties associated with measuring long-term effects or improvements from proactive efforts (the value of "nonevents").
- Heterogeneous or inconsistent definitions of "macroergonomics" and "success" limit the conclusions that can be drawn. Known or hidden trade-offs may accompany "success," meaning success for some results can come at the expense of others—raising questions of "success for whom?" and "success at what cost?"
- The global "reach" of scholarly publications is limited.

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