Toward a More Useful Utility Analysis: A Literature Review and Web Application

Bridging the Science-Practice Gap in Human Resource Decision Making

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Abstract

Scholars continue to discuss the merits and drawbacks of utility analysis (UA) as a tool for influencing management decisions. Despite its potential for quantifying the economic value of human resource interventions, UA has faced criticism for being overly complex and potentially backfiring when presented to managers. This paper synthesizes the literature on communicating validity and utility information to managers, introduces the UA+ web application, and demonstrates its usefulness through published case studies. The UA+ app incorporates evidence-based features including expectancy charts, plain-text descriptions, framing effects, and economic adjustments to enhance managerial decision-making. We illustrate the app's capabilities using three published examples: Latham and Whyte's (1994) staffing case, Avolio et al.'s (2010) leadership development analysis, and Schmidt's (2012) goal setting intervention. Our work contributes to bridging the science-practice gap by providing a practical tool that leverages research insights to help industrial-organizational psychologists and business leaders communicate the value of theory-based interventions.

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Introduction

Scholars routinely bemoan the fact that management decisions are suboptimal (Fisher et al., 2021; Highhouse, 2008; Rynes et al., 2002). Causes have been posited such as the poor training of managers (Highhouse, 2008; Rynes, 2012; Rynes et al., 2018), the widening science-practice gap (Rynes, 2012; Pfeffer & Fong, 2002), and fetish for theory in research that emphasizes complexity at the expense of validity and utility in our published research (Götz & O'Boyle, 2023). To address these concerns, educators in human resource management and industrial-organizational psychology have been encouraged to improve their training of both practitioners and scholarly researchers using methods that emphasize validity and utility of theory-based interventions (Sturman, 2000, 2001; Russell, 2022).

Utility analysis (UA) is one method of describing such evidence in statistical, economic, and heuristic terms (i.e., quantity, quality, and cost; Cascio et al., 2019). Recent examples of scholars using utility analysis to communicate the value of theory-based interventions include Avolio et al. (2010) who discuss the merits of a transformational leadership intervention; Schmidt (2012) who highlights the economic impact of goal setting; and Oprea et al. (2019) who highlight the value of a brief job crafting intervention. Consider a situation where several hundred workers must be hired into a firm. UA can be used to identify the highest quality of workers that can be reasonably delivered to the organization for a given cost (De Corte, 2011). An example is Sturman (2000) who used UA to demonstrate that an enhanced employee program described by a validity coefficient of .4 and applied to over 1400 applicants to hire 470 workers hired over several years is (after accounting for a series of adjustments) expected to yield a median return ~$1.7M experienced over the lifetime use of the program. Although large, this value represents only a few thousand dollars per hire per year. Such economic value represents potential revenue enhancements or cost savings attributed to, in this case, hiring higher-performing workers (Schmidt, 2012).

Although UA is widely viewed as a complicated tool to both teach and use, complicated tools in finance (e.g., the

Black-Scholes equation) also enjoy wide-spread use (Sturman, 2000). Russell (2022) notes that he often builds web apps for IO psychology teams to use UA to aid management decision making. What seems to be needed are tools that help decision-makers (both IOs and non-IOs alike) make use of UA insights to optimize investments more effectively in people.

With our manuscript, we make two contributions to the literature. First, we synthesize the literature on communicating validity and utility information to managers. Second, we build off both Cascio et al.'s (2019) (who designed a web app made available in their *Investing in People* textbook) and Russell (2022) (who designs web apps for UA in practice) by introducing the UA+ web app, a tool designed to leverage insights from literature to help IOs and business leaders communicate the validity and utility of theory-derived interventions. In the sections to follow, we summarize the literature informing the design of our app, explain the capabilities that the UA+ application offers over what is currently available, offer a tutorial grounded in the literature, and conclude by discussing future directions for functions built into the app. We hope the IO psychology community finds our app useful while identifying ways to enhance it and that scholars use it to teach students in applying UA to managerial decisions.

Method

A Review of the Utility Analysis (UA) Literature

UA research goes back to the 1970s (see Boudreau, 1988). The basic utility model calculates utility as the dollar value of performance differences resulting from an intervention (e.g. higher performance from better selection or training) minus the costs of the intervention. The general formula is below:

$$\Delta U = T \times N \times (Z_{barx} \times r \times SD_y) - C$$

Where:

- ΔU = Utility change from selection device
- N = Number of people hired
- T = Average tenure of those hired
- Z_{barx} = Average Z-score of predictor for hired employees
- r = Correlation between predictor and criterion (e.g., performance)
- SD_y = Dollar value of a SD change in criterion
- C = Cost of the intervention

Unfortunately, this basic equation yields grossly inflated estimates of economic value (e.g., over 14,000% return on investment; see Sturman, 2000).

Unsurprisingly, a 'futility of utility' research vein emerged positing that presenting UA information to managers back-fires (Latham & Whyte, 1994; Whyte & Latham, 1997). In a series of studies, Latham and colleagues examined whether presenting utility information (e.g., the economic value of enhanced staffing) supplemented the presentation of validity information (e.g., the accuracy of the pre-employment staffing test). Latham et al. found that while presenting validity information was received favorably, presenting utility information alongside validity information backfired, making managers hesitant to adopt a valuable intervention. This narrative is discussed to this day (e.g., van Iddekinge et al., 2023) and for good reason; practitioners should be rightly concerned about using methods that could backfire.

However, we should note that in explaining the 'futility of utility,' Cronshaw (1997) (who was a contributor to the 'futility of utility' research vein) theorized that the 'backfire effect' is attributable to a 'persuasional hypothesis'. Specifically, management is right to be skeptical of overly complex methods for the problem at hand. Cronshaw went on to posit that utility information can help managers make more optimal decisions about practices that impact the workforce when it is presented to inform rather than to persuade (Cronshaw, 1997).

Accordingly, later replication efforts showed more promise presenting utility with validity information. Carson et al. (1998) found that managers' acceptance of UA information was positively impacted by utility information, although acceptance of the proposed intervention was still distressingly low. Later work by Macan and Foster (2004) found managers ranked UA information (e.g., the economic value of an intervention) highly when making final decisions, stating the dollar values helped in this. Later, Brooks et al. (2014) found using non-traditional effect size indicators such as common language effect size (CLES) helps managers understand the validity of interventions.

We should note that scholars have provided guidance for making utility estimates more accurate that include (i) accounting for economic factors (i.e., interest, taxes, variable costs), (ii) (in the context of selection) the cost of using multiple selection devices, deviating from top-down hiring, and using a probationary period, and (iii) cohort or temporal effects (e.g., validity over time) (see Sturman, 2000). Although such adjustments can have a cumulative effect of shrinking utility estimates to levels that are ~4% of the basic utility analysis estimate and further complicate UA, they can help address flaws in assumptions of the basic model and provide a more realistic valuation of human resource programs for organizations. Unfortunately, managers' receptivity to these methods has not been examined empirically.

In sum, we believe that used thoughtfully, UA can serve as a useful tool to help business leaders make more informed decisions about investing in people. Although it has been noted that UA can be helpful where IO psychologists in their context (Russell, 2022), we believe that as a discipline we can always improve how we help both business leaders and academicians consider the implications of theory-based interventions.

Results

Introducing the Utility Analysis Plus (UA+) Tool

We introduce the Utility Analysis plus (UA+) tool. Our work builds on Cascio et al. (2019) by incorporating insights from validity and utility analysis research that have either been shown to help managers make decisions regarding how best to staff, train, and develop their talent or are believed to support management decision-making (see Table 1). Also is a glossary of terms for those less familiar with UA, and ways to export the analysis in the .pdf format. Below, we offer a tutorial of the app using three published examples: (i) the classic case of Latham and Whyte (1994) (adapted by Carson et al., 1998), (ii) using UA to estimate returns on leadership development investment (Avolio et al., 2010), and (iii) using UA to communicate goal setting intervention value (Schmidt, 2012). We do not cover all features of the app here as several are still under development (e.g., using Monte Carlo analysis to facilitate risk management). The app can be accessed here: https://uaplus.shinyapps.io/UAPlus/.

Table 1: Literature Review Summary of UA Attributes and Their Inclusion in Tools

UA Attribute	Expected Impact	Investing in People Online	UA+	Description
Validity	Positive but weak	☐	☐	Validity should help managers see that practices
Utility	Mixed	☐	☐	Utility should help managers see economic value
SDy	Mixed	☐	☐	SDy helps managers appreciate economic value
Break-even levels	Unclear	☐	☐	Break-even values help managers see minimum
Expectancy Charts	Mixed		☐	Expectancy charts help managers see validity-pr
Framing Effects	Unclear		☐	Framing utility as opportunity costs vs. monetary
Plain-Text Descriptions	Positive		☐	Plain-text descriptions improve comprehension

Case Examples

Improving Staffing: The Latham & Whyte (1994) Example

Improving Training or Employee Development

Case 1: The Avolio et al. (2010) Example

Case 2: The Schmidt (2012) Example The code for this app is available via Github: https://github.com/utilityanalysis/webApp. Interested readers are welcome to issue requests for the app or improve the app as they like for their purposes.

Discussion

We have given a brief overview of the UA+ web app. In closing, we wish to share our plans for (i) adding more features to the app and (ii) engaging in a set of literal replications to identify those features that meaningfully enhance the usefulness of this app for our community.

Planned Features

Features we plan to include follow. First, we wish to add graphical descriptions of UA (i.e. slides) that allow a causal chain to be described (e.g., % increase in training → % increase in performance → % increase in economic value), which Winkler et al. (2010) suggest help managers see how an intervention impacts the workforce. Second, concerning the accuracy of UA, Sturman (2000) notes that a Monte Carlo analysis allows a comprehensive set of adjustments to be used to accurately appraise the value of HR interventions. We hope to update the UA+ app with a Monte Carlo analysis feature that is relatively easy to use and reproduces (as closely as possible) the findings from Sturman (2000) (e.g., adjustments reduce basic utility estimates to ~4% of their initial value). Third, we wish to augment the selection utility tools in the app with a pareto-optimization feature that allows users to identify the most economic value that can be attained while diversifying the workforce (see De Corte et al., 2011; Rupp et al., 2020). Fourth, we wish to highlight the neglected role of compensation in utility research (e.g., its impact on workforce value, see Sturman, 2001). Our long-term aim is to have a tool that allows HR professionals to identify optimal bundles of interventions (e.g., combinations of staffing, training, and compensation enhancements).

Future Research Directions

We wish to close by noting that while our app's design is grounded in the literature, more information or features in the app may not always be better (Connelly et al., 2023); sometimes, less is more. Indeed, as described in Table 1, there are many claims concerning how to present evidence to managers, some of which have been supported. Therefore, our first step is to replicate those effects that have been tested in the literature via a set of literal replication studies (i.e., a replication aimed at replicating, as close as possible, the initial conditions of these studies). In this first wave of confirmatory testing, we will identify and retain information features that are useful for our community. As part of this, we will include conditions that test claims that have gone relatively untested (e.g., framing effects applied to validity). Our aim is to provide clear evidence concerning what does and does not help users make decisions regarding investing in their people and then build this information in the UA+ app. We have already begun pre-registering our methods and hypotheses on the Open Science Framework and look forward to incorporating feedback from our reviewers.

Conclusion

This paper has presented the UA+ web application as a practical tool for bridging the science-practice gap in utility analysis. By synthesizing the literature on communicating validity and utility information to managers, we have identified key features that enhance managerial decision-making, including expectancy charts, plain-text descriptions, framing effects, and economic adjustments. The UA+ app incorporates these evidence-based features to help industrial-organizational psychologists and business leaders communicate the value of theory-based interventions more effectively.

Our demonstration of the app using three published case studies—Latham and Whyte's (1994) staffing analysis, Avolio et al.'s (2010) leadership development study, and Schmidt's (2012) goal setting intervention—illustrates the app's versatility across different HR interventions. The app successfully reproduces key findings from these studies while providing additional features that enhance comprehension and decision-making.

Future development of the UA+ app will focus on incorporating Monte Carlo analysis capabilities, pareto-optimization features, and compensation considerations. Additionally, planned replication studies will systematically test the effectiveness of various presentation features to ensure that the app provides optimal support for managerial decision-making.

The UA+ app represents a step toward addressing the persistent challenge of translating research insights into practical tools that can enhance organizational decision-making. By providing a user-friendly interface that incorporates evidence-based features, we hope to contribute to the broader goal of improving how organizations invest in their people and make evidence-based decisions about human resource interventions.

References