SCISPACE
formerly Typeset

Open access • Journal Article • DOI:10.1111/J.1744-6570.2010.01197.X

Single-attribute utility analysis may be futile, but this can’t be the end of the story: causal chain analysis as an alternative — Source link

Silvan Winkler, Cornelius J. König, Martin Kleinmann

Institutions: University of Zurich

Published on: 01 Dec 2010 - Personnel Psychology (Blackwell Publishing Inc)

Topics: Causal chain

Related papers:

- The futility of utility analysis revisited: when even an expert fails
- The futility of utility analysis
- Regulatory fit from attribute-based versus alternative-based processing in decision making
- Effects of Product Involvement and Choice Context on The Use of Attitude-Based and Attribute-Based Decision Strategies
- Price and Quality Decisions by Self-Serving Managers

Share this paper:

View more about this paper here: https://typeset.io/papers/single-attribute-utility-analysis-may-be-futile-but-this-can-1y9vcx8tjd

Currently in press at
Personnel Psychology

Single-attribute utility analysis may be futile, but this can't be the end of the story:

Causal chain analysis as an alternative

Silvan Winkler, Cornelius J. König, and Martin Kleinmann

Universität Zürich, Switzerland

Acknowledgements

We would like to acknowledge Gary P. Latham for his valuable suggestions on a previous version of this article.

Introduction

More than ever before, human resource practitioners have to show a connection between their interventions and organizational performance (Cascio & Boudreau, 2008). In the context of personnel selection, performance management, and development, this means that measures showing a direct relation to strategic business goals will likely be favored by organizational decision makers (Cascio, 2000). Hence, HR departments are under pressure to continuously produce documentation for the effectiveness and efficiency of HRM (Morrow, Jarrett, & Rupinski, 1997).

Due to such pressure, HR professionals continue to search for metrics and methods that are able to demonstrate the benefits of their work and that are well accepted by organizational decision makers (Boudreau & Ramstad, 2007; Cascio & Boudreau, 2008; Lawler, 2008; Wintermantel & Mattimore, 1997). Although organizational decision makers have many tools to define how they will use, analyze, and interpret data to demonstrate such impact, utility analysis is arguably considered to be the most important, as "utility analysis is inextricably connected to strategic human capital research" (Boudreau & Ramstad, 2003, p. 215). Utility analysis, in general, describes a wide array of approaches estimating the payoff from HRM interventions such as selection, performance management, and training initiatives (Boudreau, 1990; Boudreau & Ramstad, 2003; Cascio & Boudreau, 2008; Latham & Whyte, 1994; Macan & Foster, 2004; Macan & Highhouse, 1994; Rowold & Mönninghoff, 2005). Utility analysis is intended to provide managers with a basis for deciding whether to invest in HRM interventions. It lends credibility to perceived "soft" decisions commonly associated with HRM (Cascio, 2000; Sturman, 2000).

Single-attribute utility analysis is the most established form of utility analysis (e.g., Brogden, 1949; Choragwicka & Janta, 2008; Cronbach & Gleser, 1965), even though the reactions to it often are ambivalent (see e.g., Carson, Becker, & Henderson, 1997). It calculates the benefit of an HRM intervention based on a multiplicative combination of factors related to the quality, quantity, and costs of an HRM intervention (Macan & Foster, 2004). Nevertheless, results from a large number of studies with managers have repeatedly shown levels of acceptance ratings that Carson et al. (1997, p. 84) described as being “disappointingly low”. Consequently, I/O psychology journals have begun to pay less attention to utility analysis (Boudreau & Ramstad, 2003). A recent literature review showed that academic interest in utility analysis has diminished (Cascio & Aguinis, 2008). This may in part be due to Latham and Whyte’s (1994) statement that single-attribute utility analysis is futile.

An alternative to single-attribute utility analysis is causal chain analysis. Causal chain analysis incorporates outcomes such as company performance, organizational training costs, and customer perceptions. It maps important linking elements, usually at the business-unit level of analysis (Cascio & Boudreau, 2008). Moreover, it includes multiple, financial and non-financial indicators of success (Cabrera & Raju, 2001; Kaplan & Norton, 1992). Currently, there is no empirical evidence that shows that causal chain analysis is superior to other forms of utility analysis in terms of user reactions, apart from anecdotes that it is very appealing to organizational decision makers (Lawler, Levenson, & Boudreau, 2004; Subramony, 2006). Thus, the purpose of the present study is to test whether causal chain analysis receives better reactions than single-attribute utility analysis.

Study Background

Single-attribute utility analysis

Single-attribute utility analysis is based on the multiplicative combination of several components (e.g., the standard deviation of job performance expressed in monetary units, the validity of the HRM intervention, the number of participants) related to a specific selection, performance management, or training program. The benefit of such an HRM intervention increases proportionally to these parameters. In comparison to multi-attribute utility analysis

(Aguinis & Harden, 2004; Roth, 1994; Roth & Bobko, 1997), which allows decision makers to incorporate multiple outcomes into their analytical decisions (e.g., diversity, legal exposure, organizational image), single-attribute utility analysis focuses primarily on the value of job performance in dollars.

To conduct a single-attribute utility analysis, the expenses of the intervention are subtracted from the return (Macan & Foster, 2004) using the following equation: utility analysis = (quantity × quality) – costs. Quantity equals the total number of employees affected by an intervention; quality equals the average return of the intervention in terms of a monetary value; and cost is the total cost of the intervention (Boudreau, 1991; Cascio, 1994; Macan & Foster, 2004). The basic equations of single-attribute utility analysis were developed by Brogden (1949) and refined by Cronbach and Gleser (1965) in the context of personal selection. Although it was originally used to estimate the value of selection tests (e.g., Carson et al., 1997; Latham & Whyte, 1994; Macan & Foster, 2004), it was expanded to a broad range of HRM interventions from the 1990s onwards (Sturman, 2000; Sturman, Trevor, Boudreau, & Gerhart, 2003). For example, the utility of a training intervention was assessed as follows (e.g., Cascio & Boudreau, 2008; Hazer & Highhouse, 1997; Mattson, 2003):

$$\Delta U = (dt \times SD_y \times T - C) \times N \qquad (1)$$

ΔU = Utility change from a training program

dt = Effect size, reflecting how different the persons participating in a development program are in terms of job-relevant outcomes, compared to those who do not participate (Cohen, 1992)

SD_y = Standard deviation of the monetary value of job performance among untrained employees

T = Expected duration of benefits of a trained employee

C = Total cost of training per employee

N = Number of trained people

Reactions to single-attribute utility analysis

Practitioners' reactions to single-attribute utility analysis have been less positive than hoped for by researchers. Practitioners have been found to perceive single-attribute utility analysis as too complex (Macan & Highhouse, 1994). For example, they frequently question the complex (and subjective) judgments necessary for determining some parts of Equation (1) such as SD_y (Wintermantel & Mattimore, 1997). Even among HR practitioners, one third of those participants who had used single-attribute utility analysis in the past found the results to be unbelievable and inaccurate (Macan & Highhouse, 1994).

Particularly negative were the reactions in the studies by Latham and Whyte (1994; Whyte & Latham, 1997), who found that managers gave *less* positive evaluations to a utility scenario that suggested implementing a valid selection procedure when information about the utility of that procedure was given compared to when it was not given. However, this disappointing finding may have been partly caused by the rather complex way in which the utility information was presented, as when Carson et al. (1997) compared a shorter and less complex explanation of single-attribute utility analysis to that used by Latham and Whyte, the shorter explanation resulted in significantly more favorable reactions. It should be noted, though, that even these more favorable reactions were still quite low.

Managers often seem to be skeptical of the monetary estimates because they consider them too large and as representing an unlikely risk-return ratio (Cascio & Boudreau, 2008; Latham & Whyte, 1994). As a reaction to this, some researchers have put forward arguments that support the skeptical view of practitioners. In particular, Sturman (2000) argued that applications of single-attribute utility analysis might be flawed because they employ an overly simplistic formula. He showed that even slight modifications of the formula (e.g., by including employee flows, considerations of probationary period, applying multiple selection devices) can lead to a large impact on the output. However, manipulating the magnitude of the reported financial estimate does not empirically change the (rather negative) reactions of managers to a utility analysis (Mattson, 2003).

To improve the unfavorable reactions to single-attribute utility analysis, a variety of studies focused on manipulating parameters of its presentation, as several authors (Bobko, Karren, & Kerkar, 1987; Burke & Pearlman, 1988; Carson et al., 1997; Macan & Highhouse, 1994; Rauschenberger & Schmidt, 1987) argued that managers' reactions to a given utility analysis are also a function of the manner of presentation. However, neither the presentation as text vs. video (Cronshaw, 1997; Whyte & Latham, 1997), nor the consultant type (internal vs. external, Macan & Foster, 2004), the inclusion of visual information (Lemming & Macan, 2009), the framing (loss vs. gain, Hazer & Highhouse, 1997), nor the report type (critical incident vs. anecdotal) added substantially to improving the perception of single-attribute analysis. Furthermore, reactions were unaffected by the use of different methods to calculate SD_y , the kind of intervention evaluated (training vs. selection) and the participants' comprehension level (Hazer & Highhouse, 1997).

Causal chain analysis

Causal chain analysis is an alternative method of utility analysis that focuses on measuring the linkages among HRM interventions and organizational outcomes (such as profitability) mediated by employee attitudes and customer perceptions (Boudreau & Ramstad, 2003, 2007; Cascio & Boudreau, 2008). It communicates utility analysis information in the form of causal path models (Subramony, 2006). Path coefficients are typically calculated in such a way as to provide an indication of what the expected outcome in a criterion variable will be, based on a given change in the predictor variable (Cascio & Boudreau, 2008; Gelade & Ivery, 2003; Gelade & Young, 2005; Mirvis & Lawler, 1977, 1983). For example, Sears, Roebuck & Co. used this method to link data from store associates, their on-the-job behaviors, the responses of store customers, and the financial performance of the stores (Rucci, Kirn, & Quinn, 1998). Based on these connections, Sears, Roebuck & Co. determined what drove its profit and then derived suggestions for actions that led to long-term profitability (Heskett, Jones, Loveman, Sasser, & Schlesinger, 1994).

Although different causal chain models exist, the common feature is that they calculate path models linking HRM initiatives to employee attitudes, customer perceptions, and profit (Cascio & Boudreau, 2008; Subramony, 2006). The dependent and mediating variables are usually collected at the business-unit level of analysis. Studying data at the business-unit level is necessary because this is the level at which employee survey data are typically reported (Gelade & Ivery, 2003; Harter, Schmidt, & Hayes, 2002). Furthermore, business-unit-level research provides opportunities to establish linkages to outcomes that are directly relevant to the business, and many types of organizational performance indicators often only exist at the group level (e.g., customer satisfaction, profitability, and productivity, Rogg, Schmidt, Shull, & Schmitt, 2001).

Compared to the previously mentioned multi-attribute form of utility analysis, which usually requires the active involvement of key stakeholders (Aguinis & Harden, 2004), causal chain analysis can be fully computed once the right data are in place. However, even when conducting a causal chain analysis, decision makers should be involved in the utility-model development, because otherwise this might negatively influence the reactions to it (Aguinis & Harden, 2004; Roth, 1994; Roth & Bobko, 1997).

Building the database for a causal chain analysis typically requires data from various departments within a company. Data on a specific HRM intervention represent the predictor variable (e.g., Boudreau & Ramstad, 2003), such as the percentage of staff who participated in a training program to increase customer service qualification (e.g., Gelade & Ivery, 2003). Further requirements are employee attitude surveys (e.g., Schneider, Ashworth, Higgs, & Carr, 1996), data on the customers' perception of the service quality that may stem from the marketing department (e.g., Brown & Lam, 2008; Kamakura, Mittal, de Rosa, & Mazzon, 2002), and financial performance data from the financial controlling department.

Figure 1 summarizes the logic of causal chain analysis models, based on models suggested by many authors (e.g., Boselie, Dietz, & Boon, 2005; Combs, Liu, Hall, & Ketchen, 2006; Purcell & Hutchinson, 2007) and confirmed in several fields, including industrial and organizational psychology (e.g., Gelade & Ivery, 2003; Gelade & Young, 2005; Paul & Anantharaman, 2003), operations management (e.g., Kassinis & Soteriou, 2003), and marketing (e.g., Kamakura et al., 2002; Lariviere, 2008; Pritchard & Silvestro, 2005). However, no study has yet investigated managers' reactions to causal chain analysis.

[Insert Figure 1 about here]

Differences between single-attribute utility analysis and causal chain analysis

Macan and Highhouse (1994) found that almost one quarter of their respondents felt that the complexity and difficulty of computing, understanding, and explaining single-attribute utility estimates to management contributed to their lack of use. Causal chain analyses may be easier to understand by organizational decision makers "because they offer tangible and logical structures and data to understand the intervening links between HR interventions and business outcomes, a feature that is generally lacking in existing utility models" (Boudreau & Ramstad, 2003, p. 203). Furthermore, the graphical representation as well as the outlined intermediary variables (as implemented in causal chain analysis models) may increase the understanding of causal chain analysis.

Causal chain analysis enables answers to "what if" questions, based on unstandardized path coefficients (Boudreau & Ramstad, 2003, 2007; Cascio & Boudreau, 2008), which are typically calculated to give an indication of what the expected outcome in a criterion variable will be, based on a given change in the predictor variable (Cascio & Boudreau, 2008; Gelade

& Ivery, 2003; Gelade & Young, 2005; Mirvis & Lawler, 1977, 1983). This method was already mentioned in the context of personal selection by Burke and Pearlman (1988) and Schmidt (1993), who offered percentage improvement in productivity as a potentially valuable means of expressing utility. Together with the results information, which goes beyond a single final monetary value, causal chain analysis provides a relatively complete picture of how HRM interventions influence business performance.

Latham (1988) argued that managers are not interested solely in monetary information as given by single-attribute utility analysis; they are also interested in variables such as customer satisfaction (see also, Cabrera & Raju, 2001). Causal chain analysis models suggest including variables such as customer perception and employee attitudes, leading to a "[u]seful logic linking employee variables to financial outcomes" (Boudreau & Ramstad, 2003, p. 200), thus offering an answer to Latham's criticism.

To sum up, single-attribute utility analysis and causal chain analysis share similarities but differ in important details. Both predict a monetary estimate of the pay-off of an HRM intervention, and both methodologies have the ultimate goal of influencing decisions (Cascio & Boudreau, 2008). However, only causal chain analysis (a) is presented as a graphical representation of causal paths, (b) incorporates intervening variables (i.e., customer satisfaction and employee attitudes), and (c) presents result information that goes beyond a single final monetary value (i.e., a percentage improvement in the mediating and the target variables).

As utility analysis research has so far been described as being rather atheoretical (Boudreau & Ramstad, 2003; Roth, Bobko, & Mabon, 2002), we structured the comparison of the two different utility analysis methods along the theoretical framework of human resource information success (Winkler, König, & Kleinmann, 2009). The human resource information success model (Winkler et al., 2009) outlines five constructs related to the success of HRM decision aid tools and is an adaptation of the Technology Acceptance Model (see also, Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) in the information systems field. The success of human resource information is explained in terms of the following five key variables: (a) managers' perceptions of the ease of use, and the clarity of the HRM information presented (Davis, 1989; Mattson, 2003); (b) quality as defined by perceptions of accuracy, reliability and required content (see also, Davis, 1989; Rai, Lang, & Welker, 2002); (c) usefulness as defined by the belief that the human resource information will enhance job performance (Seddon, 1997); (d) satisfaction with a given piece of information (Rai et al., 2002), and (e) use as defined by a user's actual behavior in terms of using the given information. Based on this model, we propose the following. *Hypothesis 1: Compared to single-attribute utility analysis, a causal chain analysis receives significantly higher (a) understandability ratings, (b) information quality ratings, (c) perceived usefulness ratings, (d) ratings in terms of satisfaction with information, and (e) ratings in terms of intention to use.*

In addition to the single scales, we computed a composite measure by averaging the scale scores into an overall utility reaction measure in order to test the following hypothesis. *Hypothesis 2: Compared to the single-attribute utility, causal chain analysis receives significantly higher ratings of the overall composite utility reaction measure.*

Method

Sample

Executive managers (*n* = 660) from the banking sector were surveyed in Germany, Austria, and Switzerland via an internet platform called Xing (www.xing.com), which is an internet portal for professional business networking. Study participation was voluntary and anonymous, and participants were told that the purpose of the study was to compare different forms of methods to calculate the utility of an HRM intervention.

Out of 660 potential participants, 241 (36.5%) responded. To reduce the potentially negative impact of dropout in internet-based research (Bosnjak, 2001), we included a seriousness check (Reips, 2002). In other words, we asked participants at the beginning of our questionnaire if they seriously wished to participate in this study. Only data from participants who indicated their seriousness were analyzed. Participants who indicated that they only wanted to look at the online questionnaire were removed from further analysis. Thus, the sample size was 151 (22.9%) managers.

To ensure that respondents were key informants (Chen, Farh, & Macmillan, 1993; Kumar, Stern, & Anderson, 1993), we measured their involvement in human resource-related decisions. Respondents were therefore asked to state how many employees they supervise. On average, participants led a group of 22 people (*SD* = 29.4). However, seven respondents did not supervise any employees. In line with key informant methodology (Kumar et al., 1993), these seven respondents were excluded.

The final sample of 144 (21.8%) managers comprised 81.6% males and 18.4% females. Several participants had completed only the compulsory nine years of public schooling (1.4%). A fifth of the participants (20.6%) had been to a vocational training school, completing another three to four years of apprenticeship. Most of the participants had a Bachelor's degree, had attended universities of applied sciences, or had comparable further education (42.6%). A quarter of the participants had a university degree equivalent to a Master's (25.5%). A tenth held a PhD or Master of Business Administration (9.9%). The average duration of experience working in the current function was 9.8 years (*SD* = 7.6).

Procedure & Stimulus Material

Two scenarios of utility analysis in the personnel training context (which can be found in the Appendix) served as independent variables. Each participant was randomly assigned to one of these two scenarios.

Both scenarios began with the same short introduction, describing that the manager was to assume to role of Vice President of a large company in the financial services sector (following Macan & Foster, 2004). The introduction also contained information about this company and the job of the employees, information pertaining to declining performance of employees currently holding this job, a description of the current training course and its goals, and the qualifications of the consultant presenting the utility analysis of this training program (following Macan & Foster, 2004). In order to stay close to the managers' information perception habits, we presented the stimulus material in a slide-show-like manner, as slideshows are commonly used to present information to managers, especially in the HRM context (Wempen, 2007).

Both slideshows presented participants with the following information: an explanation of the method used to calculate the monetary value (i.e., single-attribute utility analysis or causal chain analysis), information about the efficiency of the training method and the procedures used to assess this efficiency, as well as the cost of the training course. On the final slide, both scenarios led to the same estimate of monetary return of investment.

The single-attribute utility analysis version stemmed from Mattson (2003), consisting of a single-attribute utility analysis model to estimate the monetary return of a training program. The utility formula is that suggested by Cascio and Boudreau (2008). The second version consisted of a causal chain analysis-based estimation of the same program. We developed and tested this scenario together with trainers and training program managers from the in-house business school of a Swiss bank. To design the final model, we determined the parameters to be included, as well as their interlinkages, together with managers, trainers and training program managers, as recommended by several authors (Cascio, 2000; Rowold & Mönninghoff, 2005). To calculate this model, we used data that already existed in a bank, making further data collection unnecessary. Data on the training cost was provided by experienced trainers and training program managers. Data of employees' organizational commitment stemmed from a bank-wide employee survey and were measured using a six-item short form of the organizational commitment questionnaire developed by Mowday, Steers and Porter (1979). These data were made available to us on the business-unit level. Customer satisfaction data were obtained from the company's marketing department and had been collected through structured telephone interviews. These data were also made available to us on the business-level unit. Financial data were delivered to us by the bank's internal financial controlling department. It consisted of an index of financial key performance indicators (e.g., net new assets, mortgage volume net increase, and credit card sales). These indicators are measured on an individual level, and then aggregated and reported on the business unit level on a monthly basis. We calculated the unstandardized path coefficient and the relationship of the training program with customer satisfaction, employee commitment and financial gain. Just like in Mattsons (2003) study, we based our calculations on real data from the bank and the parameters given in the causal chain analysis scenario are within a range of values we found within that bank (e.g., training costs). This yielded a scenario that led to the same return on investment as the single-attribute utility analysis scenario.

To ensure that potential differences in the dependent variables were not caused by the effort required by participants to process the scenarios (Carson et al., 1997), we parallelized the two scenarios in terms of reading ease and execution time. Both scenarios used exactly the same introduction text (one slide) and five subsequent slides to outline one of the two different methodologies of utility analysis models and its results. Table 1 shows the most important indices of German reading level statistics in order to outline the comparability of the two scenarios regarding reading ease (http://www.benutzerfreun.de/itext/cgi-bin/itext.pl). The German Flesch Reading Ease index and Amdahl's German understandability index consider both the average sentence length and the average number of syllables per word, but with different weighting factors. The Wiener Formula for specialized texts compares the ratio of words with three or more syllables with the average number of words per sentence, the ratio of words with more than six letters and the ratio of monosyllabic words. Finally, the Gunning-Fog index accounts for the average number of words per sentence and the ratio of words with three or more syllables. As Table 1 shows, the reading level statistics were fairly similar. Furthermore, the average time to complete the study was 8 minutes and 55 seconds (*SD* = 7 minutes and 21 seconds) for the causal chain analysis and 10 minutes and 17 seconds (*SD* = 5 minutes and 5 seconds) for utility analysis, a non-significant difference ($t(140) = 1.24$, $p = 0.22$, two-tailed). Thus, the effort to process the two scenarios was approximately the same.

[Insert Table 1 about here]

Measures

All of the items of the following scales are answered on a 5-point scale (1 = strongly disagree, 5 = strongly agree).

Understandability. The two items on this scale were those used in previous studies on reactions to utility analysis (Carson et al., 1997; Hazer & Highhouse, 1997; Mattson, 2003; Whyte & Latham, 1997). The items were "How well did you understand this consultant's proposal?" and "To what extent was the proposal clearly presented?"

Information quality. We used the Winkler et al. (2009) information quality scale: “The information from this utility analysis is the precise information I need”, “The information from this utility analysis is exactly what I need to make a decision”, “The information from this utility analysis is sufficient to enable me to make my decision”, and “I am satisfied with the accuracy of the information from this utility analysis”.

Perceived usefulness. The items (Winkler et al., 2009) were: “Using this utility analysis improves the quality of my decision”, “I find this utility analysis useful for my decision”, “Using utility information enables me to make a decision more easily”, and “Using this utility analysis makes it easier to do my job as a manager". Due to reliability considerations, we dropped an additional item used by Winkler et al. (2009).

Information satisfaction. We assessed overall satisfaction with the utility analysis method by using a one-item omnibus measure introduced by Winkler et al. (2009) for measuring the global satisfaction with human resource information ("How would you rate your satisfaction with the human resource information available?"). In the context of information systems, the empirical results obtained by Rai et al. (2002) and Baroudi and Orlikowski (1988) confirmed that a single-item measure of user satisfaction can be used to assess overall user information satisfaction. Furthermore, within the context of I-O psychology, single-item indicators of job satisfaction show strong convergent validity with job satisfaction scales, and are thus considered to be robust (Wanous & Hudy, 2001; Wanous, Reichers, & Hudy, 1997).

Intention to use. This scale is based on that of Hazer and Highhouse (1997), describing the users' intention to use the information presented: "As the Vice President, I will use the utility information in deciding whether or not to continue the program", "As the Vice President, I will use utility analysis in future evaluations of other Human Resource programs"; "As the Vice President, I will encourage the Human Resources Department to continue doing utility analysis", "As the Vice President, I recommend utility analysis to other organizations", and "As the Vice President, this presentation of utility analysis is very influential in my final decision".

Results

Table 2 presents the means, standard deviations, reliabilities, and correlations among the variables of this study. We first used the General Linear Model procedure of SPSS 15.0 to conduct a MANOVA with the utility analysis method as the independent variable and the five variables from the human resource information success model as the set of dependent variables. We found a significant multivariate main effect for the utility analysis method using the five human resource information reaction scales, $F(1,8) = 6.91$, $p < 0.001$, $\eta^2 = .20$, indicating that there was a significant difference between the two methods of utility analysis. As shown in Figure 2, managers perceived causal chain analysis as being significantly more understandable ($M = 4.20$, $SD = 0.58$) than single-attribute utility analysis ($M = 3.48$, $SD = 0.88$), $d = .95$, t (142) = 5.73, $p < .01$. Causal chain analysis was perceived significantly higher in terms of information quality ($M = 2.91$, $SD = 0.67$) than single-attribute utility analysis ($M = 2.66$, $SD = 0.71$), $d = .37$, t (142) = 2.20, $p < .05$. Managers rated the two methods as similar, with no statistically significant differences in terms of perceived usefulness ($M_{causal\ chain\ analysis} = 3.56$, $SD = 0.75$; $M_{single\text{-}attribute\ utility\ analysis} = 3.39$, $SD = 0.83$), $d = .22$, t (142) = 1.34, $p = .18$, with a trend towards higher values for causal chain analysis. The causal chain analysis led to significantly higher user information satisfaction ($M = 3.50$, $SD = 0.61$) than single-attribute utility analysis ($M = 3.16$, $SD = 0.62$), $d = .54$, t (142) = 3.26, $p < .01$, and managers intended to use causal chain analysis significantly more readily ($M = 3.50$, $SD = 0.80$) than single-attribute utility analysis ($M = 3.10$, $SD = 0.87$), $d = .48$, t (141) = 2.89, $p < .01$. The composite measure built out of these scales yielded an average of $M = 3.16$ ($SD = 0.67$) for single-attribute utility analysis and $M = 3.53$ ($SD = 0.58$) for causal chain analysis, $d = .60$, t (141) = 3.59, $p < .01$. Taken together, these findings show that hypotheses 1a, 1b, 1d, 1e, and hypothesis 2 were supported, whereas hypothesis 1c was only descriptively supported, as causal chain analysis was descriptively but not significantly more highly rated in terms of perceived usefulness.

[Insert Table 2 and Figure 2 about here]

Discussion

This study compared single-attribute utility analysis with causal chain analysis, and revealed that causal chain analysis received better reactions from managers than single-attribute utility analysis. For four of five variables related to human resource information success, we found significantly higher values for causal chain analysis. The largest difference was understandability (*d* = .95), pointing to one of the key strengths of causal chain analysis.

The higher acceptance of causal chain analysis fits in nicely with the finding of Hazer and Highhouse (1997), who argued that the CREPID methodology to determine SD_y is particularly difficult to explain and understand (Highhouse, 1996). This argument was supported by their finding that the CREPID methodology of determining SD_y yielded the least favorable reactions. A similar explanation seems to come into play when causal chain analysis and single-attribute utility analysis are compared, because causal chain analysis is likely to be less difficult to understand and thus likely to be preferred by managers.

The positive findings for information quality point towards another difference between utility analysis and causal chain analysis, which is that it incorporates intervening variables such as customer satisfaction and employee attitudes. This seems to be an explanation of what influences managers' evaluation in favor of causal chain analysis, as the process leading to a final monetary estimate becomes more transparent, granular, and potentially closer to managers' cognitive processes. Furthermore, in terms of information quality, the reason for the higher success ratings of causal chain analysis might be that the final monetary estimate of return is enriched with information about further important variables of business performance. This allows a more detailed justification of a potentially high return of an HRM initiative, inspires further discussion of the strategic goals of this specific HRM initiative, allows simulations of "what-if" scenarios, and finally gives a more complete picture of how an HRM intervention actually influences the mediating and the target variables.

Although causal chain analysis and single-attribute utility analysis differ in the manner of presentation, there are good reasons to doubt that this difference was really crucial. In particular, Lemming and Macan (2009) showed that including visual information in their single-attribute utility analysis scenarios did not significantly improve participants' reactions. Possibly, the type of presentation is less important than the lack of mathematical expressions, which managers are rather reluctant to deal with (see also Lemming and Macan, 2009; but see Mattson, 2003). It should be noted that mathematical expressions are, of course, used to calculate path models for causal chain analyses – but there is no need to present the formulae because they can be replaced by arrows representing paths.

To sum up, our results show encouraging evidence for managers' greater readiness to accept causal chain analysis rather than single-attribute utility analysis. Acceptance may not be equivalent to success, but the acceptance of a utility analysis method is an important precondition for success (Petter, DeLone, & McLean, 2008).

Limitations and future research

One of the basic assumptions of causal chain analysis is that it implies a causal connection between HRM interventions and variables such as employee commitment, customer satisfaction or financial company performance. These paths have been challenged (e.g., Wright, Gardner, Moynihan, & Allen, 2005), and research is not yet conclusive when it comes to other causal connections, which are a vital part of any causal chain analysis (Cascio & Boudreau, 2008; Ryan, Schmit, & Johnson, 1996; Schneider, Hanges, Smith, & Salvaggio, 2003). Even though there is encouraging evidence for many of these possible links (e.g., Harrison, Newman, & Roth, 2006), certainty can only be gained by conducting further longitudinal studies such as the encouraging study by Birdi et al. (2008). Second, a further direction for future research relates to the appropriate time lag that should be assumed within a causal chain analysis model, as there is no clear consensus in the academic literature about what the most appropriate time lag would be (Cascio & Boudreau, 2008).

Compared to the response rate in our study, response rates of paper-and-pencil mail surveys often are higher. However, as we recruited online, as participation was voluntary, and as the only reward that we provided was sending participants the study results, we were still positively surprised by this response rate. Furthermore, if we had not applied our rigorous screening methods, the response rate would have been higher (i.e., 36.5%). More importantly, Krosnick (1999, p. 540) wrote, when summarizing survey research in his Annual Review of Psychology chapter, that "the substantive conclusions of a study have often remained unaltered by an improved response rate", implying that a higher response rate would have been unlikely to change our results.

A further limitation is that some differences remain in the way in which the two methods were presented, despite them being parallelized in terms of reading ease and execution time. Although we cannot rule out that other ways of presenting the information could have had an effect on the results, this may not be very likely given that several studies showed that different ways of presenting utility analysis information has no effect on reactions of the target audience (e.g., Cronshaw, 1997; Hazer & Highhouse, 1997; Macan & Foster, 2004; Whyte & Latham, 1997), as mentioned earlier.

Furthermore, we suggest to run focus groups about why decision makers tend to like causal chain analysis, and to compare causal chain analysis with other forms of utility analysis such as multi-attribute utility analysis (Aguinis & Harden, 2004; Roth & Bobko, 1997). Given the strength inherent in multi-attribute utility analysis of requiring the active involvement of key stakeholders, such a comparison could help to answer the question of when managers really want to use decision aids such as utility analysis. For example, the amount of involvement of the target audience in the analytical procedure might be one of several key factors influencing the reactions towards a given utility analysis procedure. Here, our practical experience with conducting and communicating causal chain analysis-based information shows us that high-level managers (HR and front-line) welcome, appreciate, and even encourage the effort to quantify the value added by HR and to increase the transparency of the various HR-related processes and initiatives. In turn, some HR business partners and some lower-level front-line managers react less positively. Although HR business partners are the ones whose job it is to help front-line managers to understand the causal chain analysis results, they often did not feel sufficiently comfortable with the statistical analysis upon which the causal chain analyses were based. Furthermore, HR business partners sometimes seem to prefer to make HR-related suggestions based on their gut feeling rather than on data, and such a preference for gut-driven decisions may also be considerably common among lower-level front-line managers. Thus, some people in the bank that offered the study data to us have begun to consider offering some training on causal chain analysis (at least to HR business partners). This confirms, from an anecdotal perspective, what Sturman (2000, p. 297) noted: "For a complex decision making tool to be useful, the users of the decision aid must desire the information it provides and be trained in its use."

In addition, the utility analysis field could benefit from being linked to the judgment and decision making literature, as has been recently noted (Dalal et al., in press). In particular, Scott Highhouse (in Dalal et al., in press) pointed out that the judgment and decision making researchers have studied the problems many people have with understanding even simple statistical analyses and try to develop ways to communicate information that is more in sync with how the human brain works (e.g., Gigerenzer, Gaissmaier, Kurz-Milcke, Schwartz, & Woloshin, 2008). Potentially, findings from this stream of research could also be used to develop better ways of communicating utility analyses.

Practical implications

For practitioners, causal chain analysis might offer an attractive alternative to the standard approach of utility analysis, particularly as the results of our hypothetical study showed significantly higher values for managers' intent to use this method, and we hope that many organizations will experience the potential of causal chain analysis in the future.

It should, however, not be omitted that those who like to use causal chain analysis need to overcome some challenges. To build a causal chain analysis, data collection and annual updates may be time-consuming and expensive, and the available data have to fulfill several criteria (e.g., completeness of the data set, reliability, validity, stability of the units of investigation over time, continuous use of measurement procedures). Even though such hindrances might seem daunting at first glance, eighty percent of organizations have been reported to have an enterprise-wide HRM information system that could be linked to business data (Lawler et al., 2004). Thus, the main task may be to combine data from different databases (and/or investing some time to locate these data) rather than having to collect many data from scratch. In addition, some statistical knowledge is required to perform the statistical analysis (although running path analysis is not likely to be perceived as very difficult for someone with at least a Master's degree in industrial and organizational psychology). Thus, practitioners should be encouraged to overcome these challenges, given the potential of causal chain analysis.

Finally, causal chain analysis could be used for a broad range of HR interventions (e.g., Assessment Centers, 360° feedback) and processes (e.g., training, performance management, talent management). Combining such indicators (e.g., the ratio of customer sales representatives per business-unit who received a 360° feedback) with indicators from employee surveys (e.g., the perception of training and learning opportunities) leads to a more complete picture and could be seen as a next step towards a systems perspective of HR (Lado & Wilson, 1994; Yeung & Berman, 1997).

Conclusion

Utility analysis research nowadays finds itself in a paradoxical trap: Although HRM departments are becoming increasingly interested in demonstrating the contribution of HRM to the success of organizations, the standard answer of industrial and organizational psychology – single-attribute utility analysis – was described as being futile (Latham & Whyte, 1994). The causal chain form of utility analysis might provide a way out of this trap, helping HRM to position itself as a truly strategic partner supporting vital decisions about human capital (Cascio & Aguinis, 2008).

References

Aguinis, H., & Harden, E. (2004). Will banding benefit my organization? An application of multi-attribute utility analysis. In H. Aguinis (Ed.), *Test score banding: Legal, technical, and societal issues* (pp. 193-216). Westport, CT: Praeger.

Baroudi, J. J., & Orlikowski, W. J. (1988). A short-form measure of user information satisfaction: A psychometric evaluation and notes on use. *Management Information Systems, 4*, 44-59.

Birdi, K., Clegg, C., Patterson, M., Robinson, A., Stride, C. B., Wall, T. D., et al. (2008). The impact of human resource and operational management practices on company productivity: A longitudinal study. *Personnel Psychology, 61*, 467-501.

Bobko, P., Karren, R., & Kerkar, S. P. (1987). Systematic research needs for understanding supervisory-based estimates of SD_y in utility analysis. *Organizational Behavior and Human Decision Processes, 40*, 69-95.

Boselie, P., Dietz, G., & Boon, C. (2005). Commonalities and contradictions in HRM performance research. *Human Resource Management Journal, 15*, 67-94.

Bosnjak, M. (2001). Participation in non-restrictive web surveys: A typology and explanatory model for item non-response. In U.-D. Reips & M. Bosnjak (Eds.), *Dimensions of internet science* (pp. 193-208). Lengerich, Germany: Pabst Science.

Boudreau, J. W. (1990). Utility analysis for decisions in human resource management. In M. D. Dunnette & L. M. Houghs (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., pp. 621-745). Palo Alto, CA: Consulting Psychologists Press.

Boudreau, J. W., & Ramstad, P. M. (2003). Strategic industrial and organizational psychology and the role of utility analysis models. In D. R. I. Bormann & R. J. Klimoski (Eds.), *Handbook of industrial and organizational psychology* (pp. 193-217). New York: Wiley.

Boudreau, J. W., & Ramstad, P. M. (2007). *Beyond HR: The new science of human capital*. Boston, MA: Harvard Business School Press.

Brogden, H. E. (1949). A new coefficient: Application to biserial correlation and to estimation of selective efficiency. *Psychometrika, 14*, 169-182.

Brown, S. P., & Lam, S. K. (2008). A meta-analysis of relationships linking employee satisfaction to customer responses. *Journal of Retailing, 84*, 243-255.

Burke, M. J., & Pearlman, K. (1988). Recruiting, selecting, and matching people with jobs. In J. P. Campbell & R. J. Campbell (Eds.), *Productivity in organizations* (pp. 97-142). San Francisco, CA: Jossey-Bass.

Cabrera, E. F., & Raju, N. S. (2001). Utility analysis: Current trends and future directions. *International Journal of Selection and Assessment, 9*, 92-102.

Carson, K. P., Becker, J. S., & Henderson, J. A. (1997). Is utility really futile? A failure to replicate and an extension. *Journal of Applied Psychology, 83*, 84-96.

Cascio, W. F. (2000). *Costing human resources* (4th ed.). Cincinnati, OH: South-Western College Publishing.

Cascio, W. F., & Aguinis, H. (2008). Research in industrial and organizational psychology from 1963 to 2007: Changes, choices, and trends. *Journal of Applied Psychology, 93*, 1062-1081.

Cascio, W. F., & Boudreau, J. W. (2008). *Investing in people: Financial impact of human resource initiatives*. Upper Saddle River, NJ: Pearson Education.

Chen, M. J., Farh, J. L., & Macmillan, I. C. (1993). An exploration of the expertness of outside informants. *Academy of Management Journal, 36*, 1614-1632.

Choragwicka, B., & Janta, B. (2008). Why is it so hard to apply professional selection methods in business practice? *Industrial and Organizational Psychology, 1*, 355-358.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159.

Combs, J., Liu, Y. M., Hall, A., & Ketchen, D. (2006). How much do high-performance work practices matter? A meta-analysis of their effects on organizational performance. *Personnel Psychology, 59*, 501-528.

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

Dalal, R. S., Bonaccio, S., Highhouse, S., Ilgen, D. R., Mohammed, S., & Slaughter, J. E. (in press). What if industrial-organizational psychology decided to take workplace decisions seriously?

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*, 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science 35*, 982-1003.

Gelade, G. A., & Ivery, M. (2003). The impact of human resource management and work climate on organizational performance. *Personnel Psychology, 56*, 383-404.

Gelade, G. A., & Young, S. (2005). Test of a service profit chain model in the retail banking sector. *Journal of Occupational and Organizational Psychology, 78*, 1-22.

Gigerenzer, G., Gaissmaier, W., Kurz-Milcke, E., Schwartz, L., & Woloshin, S. (2008). Helping doctors and patients make sense of health statistics. *Psychological Science in the Public Interest, 8*, 53-96.

Harrison, D. A., Newman, D. A., & Roth, P. L. (2006). How important are job attitudes? Meta-analytic comparisons of integrative behavioral outcomes and time sequences. *Academy of Management Journal, 49*, 305-325.

Harter, J. K., Schmidt, F. L., & Hayes, T. L. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. *Journal of Applied Psychology, 87*, 268-279.

Hazer, J. T., & Highhouse, S. (1997). Factors influencing managers' reactions to utility analysis: Effects of SD_y method, information frame, and focal intervention. *Journal of Applied Psychology, 82*, 104-112.

Heskett, J. L., Jones, T. O., Loveman, G. W., Sasser, W. E., & Schlesinger, L. A. (1994). Putting the service-profit chain to work. *Harvard Business Review, 72*, 164-174.

Highhouse, S. (1996). The utility estimate as a communication device: Practical questions and research directions. *Journal of Business and Psychology, 11*, 85-100.

Kamakura, W. A., Mittal, V., de Rosa, F., & Mazzon, J. A. (2002). Assessing the service-profit chain. *Marketing Science, 21*, 294-317.

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard: Measures that drive performance. *Harvard Business Review, 70*, 71-79.

Kassinis, G. I., & Soteriou, A. C. (2003). Greening the service profit chain: The impact of environmental management practices. *Production and Operations Management, 12*, 386-403.

Krosnick, J. A. (1999). Survey research. *Annual Review of Psychology, 50*, 537-567.

Kumar, N., Stern, L. W., & Anderson, J. C. (1993). Conducting interorganizational research using key informants. *Academy of Management Journal, 36*, 1633-1651.

Lado, A. A., & Wilson, M. C. (1994). Human resource systems and sustained competitive advantage: A competency-based perspective. *Academy of Management Review, 19*, 699-727.

Lariviere, B. (2008). Linking perceptual and behavioral customer metrics to multiperiod customer profitability: A comprehensive service-profit chain application. *Journal of Service Research, 11*, 3-21.

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

Lawler, E. E. (2008). *Talent: Making people your competitive advantage*. San Francisco, CA: Jossey-Bass.

Lawler, E. E., Levenson, A., & Boudreau, J. W. (2004). HR metrics and analytics: Use and impact. *Human Resource Planning, 27*, 27-35.

Lemming, M. R., & Macan, T. H. (2009, April). *Adjustment and restructuring effects of UA information on managerial acceptance.* Paper presented at the 24th annual conference of the Society for Industrial and Organizational Psychology, New Orleans, LA.

Macan, T. H., & Foster, J. (2004). Managers' reactions to utility analysis and perceptions of what influences their decisions. *Journal of Business and Psychology, 19*, 241-253.

Macan, T. H., & Highhouse, S. (1994). Communicating the utility of human resource activities: A survey of I/O and HR professionals. *Journal of Business and Psychology, 8*, 425-436.

Mattson, B. W. (2003). The effects of alternative reports of human resource development results on managerial support. *Human Resource Development Quarterly, 14*, 127-151.

Mirvis, P. H., & Lawler, E. E. (1977). Measuring financial impact of employee attitudes. *Journal of Applied Psychology, 62*, 1-8.

Mirvis, P. H., & Lawler, E. E. (1983). Systems are not solutions: Issues in creating information-systems that account for the human organization. *Accounting Organizations and Society, 8*, 175-190.

Morrow, C. C., Jarrett, M. Q., & Rupinski, M. T. (1997). An investigation of the effect and economic utility of corporate-wide training. *Personnel Psychology, 50*, 91-119.

Mowday, R. T., Steers, R. M., & Porter, L. W. (1979). Measurement of organizational commitment. *Journal of Vocational Behavior, 14*, 224-247.

Paul, A. K., & Anantharaman, R. N. (2003). Impact of people management practices on organizational performance: Analysis of a causal model. *International Journal of Human Resource Management, 14*, 1246–1266.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information Systems, 17*, 236-263.

Pritchard, M., & Silvestro, R. (2005). Applying the service profit chain to analyse retail performance: The case of the managerial strait-jacket? *International Journal of Service Industry Management, 16*, 337-356.

Purcell, J., & Hutchinson, S. (2007). Front-line managers as agents in the HRM-performance causal chain: Theory, analysis and evidence. *Human Resource Management Journal, 17*, 3-20.

Rai, A., Lang, S. S., & Welker, R. B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. *Information Systems Research, 13*, 50-69.

Rauschenberger, J. M., & Schmidt, F. L. (1987). Measuring the economic impact of human resource programs. *Journal of Business and Psychology, 2*, 50–59.

Reips, U.-D. (2002). Standards for internet-based experimenting. *Experimental Psychology, 49*, 243-256.

Rogg, K. L., Schmidt, D. B., Shull, C., & Schmitt, N. (2001). Human resource practices, organizational climate, and customer satisfaction. *Journal of Management, 27*, 431-449.

Roth, P. L. (1994). Multiattribute utility analysis using the PROMES approach. *Journal of Business and Psychology, 9*, 69-80.

Roth, P. L., & Bobko, P. (1997). A research agenda for multi-attribute utility analysis in human resource management. *Human Resource Management Review, 7*, 341-368.

Roth, P. L., Bobko, P., & Mabon, H. (2002). Utility analysis: A review and analysis at the turn of the century. In A. Neil, D. S. Ones, S. Handan Kepir & C. Visvesvaran (Eds.), *Handbook of industrial, work and organizational psychology* (Vol. 1, pp. 362-384). Thousand Oaks, CA: Sage.

Rowold, J., & Mönninghoff, M. (2005). Strategic human resource utility analysis. *Journal of Human Resource Costing & Accounting, 9*, 10-25.

Rucci, A. J., Kirn, S. P., & Quinn, R. T. (1998). The employee-customer profit chain at Sears. *Harvard Business Review, 76*, 82-97.

Ryan, A. M., Schmit, M. J., & Johnson, R. (1996). Attitudes and effectiveness: Examining relations at an organizational level. *Personnel Psychology, 49*, 853-882.

Schmidt, F. L. (1993). Personnel psychology at the cutting edge. In N. Schmitt & W. C. Borrnan (Eds.), *Personnel selection in organizations* (pp. 497-515). San Francisco, CA: Jossey-Bass.

Schneider, B., Ashworth, S. D., Higgs, C. A., & Carr, L. (1996). Design, validity, and use of strategically focused employee attitude surveys. *Personnel Psychology, 49*, 695-705.

Schneider, B., Hanges, P. J., Smith, D. B., & Salvaggio, A. N. (2003). Which comes first: Employee attitudes or organizational financial and market performance? *Journal of Applied Psychology, 88*, 836-851.

Seddon, P. B. (1997). A respecification and extension of the DeLone and McLean model of IS success. *Information System Research, 8*, 240-253.

Sturman, M. C. (2000). Implications of utility analysis adjustments for estimates of human resource intervention value. *Journal of Management, 26*, 281-299.

Sturman, M. C., Trevor, C. O., Boudreau, J. W., & Gerhart, B. (2003). Is it worth to win the talent war? Evaluating the utility of performance-based pay. *Personnel Psychology, 56*, 997-1035.

Subramony, M. (2006). Why organizations adopt some human resource management practices and reject others: An exploration of rationales. *Human Resource Management, 45*, 195-210.

Wanous, J. P., & Hudy, M. J. (2001). Single-item reliability: A replication and extension. *Organizational Research Methods, 4*, 361-375.

Wanous, J. P., Reichers, A. E., & Hudy, M. J. (1997). Overall job satisfaction: How good are single-item measures? *Journal of Applied Psychology, 82*, 247-252.

Wempen, F. (2007). *PowerPoint 2007 bible*. Indianapolis, IN: Wiley.

Whyte, G., & Latham, G. (1997). The futility of utility analysis revisited: When even an expert fails. *Personnel Psychology, 50*, 601-610.

Winkler, S., König, C. J., & Kleinmann, M. (2009). *What makes human resource information successful?* Manuscript submitted for publication. University of Zurich, Switzerland.

Wintermantel, R. E., & Mattimore, K. L. (1997). In the changing world of human resources: Matching measures to mission. *Human Resource Management, 36*, 337-342.

Wright, P. M., Gardner, T. M., Moynihan, L. M., & Allen, M. R. (2005). The relationship between HR practices and firm performance: Examining causal order. *Personnel Psychology, 58*, 409-446.

Yeung, A. K., & Berman, B. (1997). Adding value through human resources: Reorienting human resource measurement to drive business performance. *Human Resource Management, 36*, 321-335

Table 1

Reading Level Statistics for the Single-Attribute Utility Analysis and the Causal Chain Utility Analysis Presentation

Index for reading ease	Single-attribute utility analysis scenario	Causal chain analysis scenario
German Flesch Reading Ease*	41	38
Amdahl's German understandability index**	48	43
Wiener Formula for specialized texts*	11	11
Gunning-Fog Index*	18	18

Note. *Higher values indicate a text that is more difficult to read. **Higher values indicate a text that is easier to read.

Table 2

Means, Standard Deviations, Internal Consistencies, and Correlations

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Understandability	3.87	0.84	*.89*						
2. Information quality	2.79	0.70	.41**	*.79*					
3. Perceived usefulness	3.48	0.79	.53**	.66**	*.88*				
4. Information satisfaction	3.33	0.63	.68**	.81**	.75**	-			
5. Intention to use	3.30	0.86	.59**	.64**	.76**	.77**	*.86*		
6. Composite reaction measure	3.34	0.65	.76**	.81**	.87**	.93**	.89**	*.90*	
7. Causal chain analysis (=1), single-attribute utility analysis (=0)	0.51	0.50	.43**	.18*	.11	.26**	.24**	.29**	-

Note. Cronbach's alpha estimates of reliabilities are on the diagonal. $N = 144$, with the exception of intention to use ($N = 143$ due to missing data).

* $p < .05$; ** $p < .01$.

Figure Captions

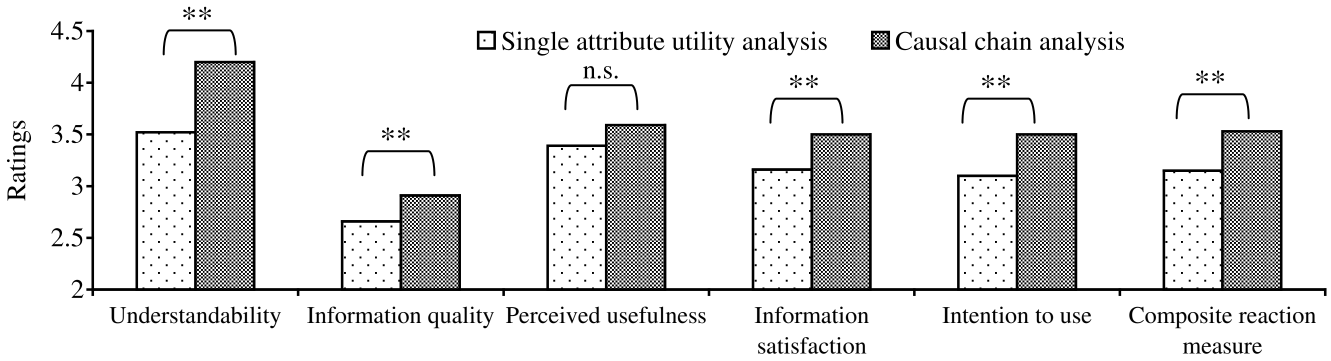
Figure 1. Basic assumptions of the causal chain analysis approach to utility analysis.

Figure 2. Reactions to single attribute utility analysis vs. causal chain analysis.

Figure 1


HRM
interventions
(e.g., training)
Employee attitudes (e.g.,
organizational commitment)
Customer perceptions (e.g.,
customer satisfaction)
Outcomes
(e.g., profit)

Figure 2



Single attribute utility analysis
Causal chain analysis
Ratings
4.5
4
3.5
3
2.5
2
**
n.s.
Understandability
Information quality
Perceived usefulness
Information satisfaction
Intention to use
Composite reaction measure

Appendix

The follow slides represent an English translation of the stimulus material that was originally presented in German.

Single-attribute utility analysis scenario, slide 1/5

- The following utility analysis calculates both the costs and the utility of a given human resource initiative such as a training.
- It consists of the following formula and transforms the utility into a monetary value, and it also considers the costs of the training.

$$\Delta U = (dt \times SDy \times T - C) \times N$$

ΔU: Utility of the training initiative in a monetary value.

Single-attribute utility analysis scenario, slide 2/5

$$\Delta U = (dt \times SDy \times T - C) \times N$$

dt: The difference in job performance as measured between a group of trained and untrained team members, measured on a scale from 0 to 1 (whereas 0 = no difference; 1 = very large difference).

- *The value for this training equals 0.4*
- *The value for your division was calculated based on a performance test for customer sales representatives.*

Single-attribute utility analysis scenario, slide 3/5

$$\Delta U = (dt \times SDy \times T - C) \times N$$

SDy: Refers to the dollar value difference in performance between high and low performers. The larger the difference in how well people perform on the job as measured by SDy, the higher the potential gain from training employees.

- *In your division, SDy was calculated by surveying the managers of training program participants. Managers were asked to estimate the financial value of the productivity of both a high performing and a low performing employee.*
- *In your division, the average difference in annual financial value between high and low performing employees (or SDy) was $7,500.*

Single-attribute utility analysis scenario, slide 4/5

T = The duration of the training program's effect on employee job performance.

The average effect duration of such a training program in comparable organizations equals one year.

N = Number of training participants.

In your area, 250 employees participated in the training.

$$\Delta U = (dt \times SDy \times T - C) \times N$$

C: The per person cost of the training program.

- *This includes all costs associated with administering the training program (including materials, equipment, facilities, etc.).*
- *These costs equal $ 150'000. With a total participation of 250 employees, the per participant cost equals $ 600.*

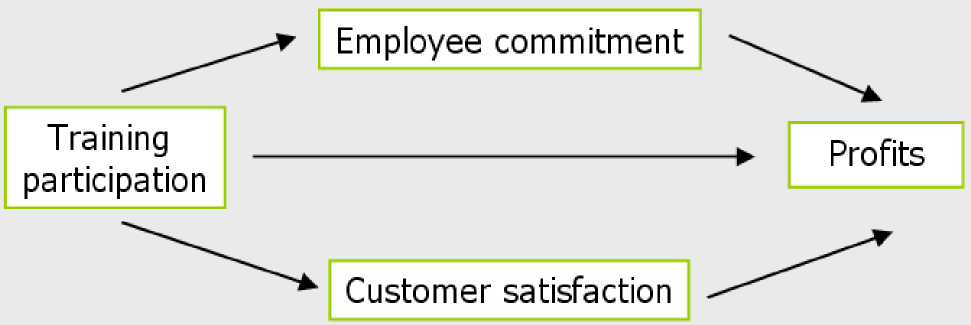
Single-attribute utility analysis scenario, slide 5/5

- Finally, the return on investment (ROI) can be calculated. By putting the aforementioned values into the equation explained, the financial utility of this training program equals $ 600'000. This represents the financial utility after 1 year.
- The costs of conducting the training equals $ 150'000. Putting these figures into the calculation stated below, the ROI equals 400%.

$$\textbf{ROI} = \frac{\$\ 600'000}{\$\ 150'000} = \textbf{400\%}$$

Causal chain analysis scenario, slide 1/5

- The utility analysis described here includes both financial and non-financial measures.
- It consists of the statistical linkage of the training initiative with employees' engagement, customer satisfaction, and profits.

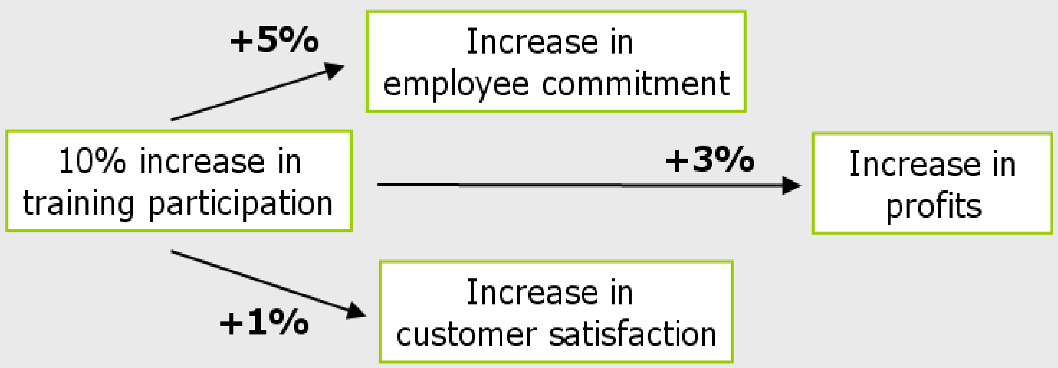


Causal chain analysis scenario, slide 2/5

- In the past year, 25 teams of your division participated in this initiative. In each team, between 0% (= no team member) and 100% (= all team members) participated in the training.
- After one year, teams with a higher participation rate…
  - …were more committed (measured by an employee survey)
  - …had more satisfied customers (measured by a customer satisfaction survey)
  - …and generated higher profits than teams with a low participation rate.

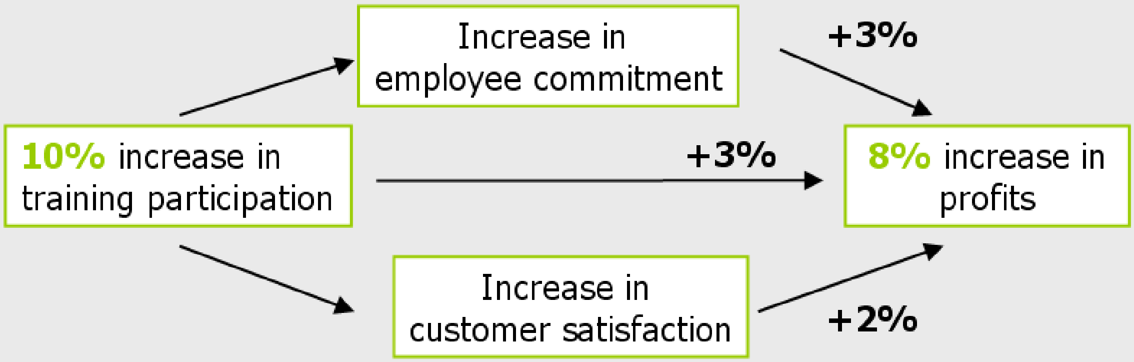
Causal Chain Analysis scenario, slide 3/5

- In your area, analysis showed that a 10% increase in training participation will lead to…
  - …an increase in employee commitment of **5%,**
  - …an increase in profits of **3%,**
  - …an increase in customer satisfaction of **1%.**



Causal Chain Analysis scenario, slide 4/5

- The increase in employee commitment led to a 3% increase in profits.
- The increase in customer satisfaction led to a 2% increase in profits.
- Added up, a 10% increase in training participation led to an 8% increase in profits.



Causal Chain Analysis scenario, slide 5/5

- Finally, the return on investment (ROI) can be calculated. The ROI reflects the profit to be expected out of a 10% increase in employees with training participation.
- A 10% increase in training participation leads to an 8% increase in profits. This equals $ 600'000 additional profits.
- The costs of conducting 10% more training equals $ 150'000.
- Putting these figures into the calculation stated below, the ROI equals 400%.

$$\textbf{ROI} = \frac{\$\ 600'000}{\$\ 150'000} = \textbf{400\%}$$