

Measurement metrics at aggregate levels of analysis: Implications for organization culture research and the GLOBE project

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Abstract

We propose that scholars who are interested in group, organizational, or societal constructs should consider three approaches to designing aggregate measures. The typical approach to aggregate measure design in organization studies is to create measures based on individual-level metric structures, then evaluate whether the individual level measures can be aggregated. We propose that the field continue to use this approach for fundamentally individual-level constructs, but to also make greater use of two alternative approaches that are now only occasionally used. One approach used in cross-cultural research is to aggregate items to the target level, then evaluate measurement structure based on the relationships among *items* at the target level. Another approach is to aggregate individual-level scales to the target level, then evaluate measure characteristics based on the relationships among *scales* at the target level. We also recommend that constructing measures based on relationships among items or among scales at aggregate levels offers an approach to studying organizational culture that is distinct from organizational climate. We apply the distinctions between different approaches to aggregate measure design to a recent *Leadership Quarterly* article and to the GLOBE project on which that article is based.

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1. Introduction

The issues of level of analysis that typically arise in the organizational literature differ from those that typically arise in the cross-cultural literature. The organizational culture and climate literatures and the literature about aggregating survey data to the group level have long reflected scholars' awareness that *relationships between predictors and criteria* that are found at the individual level may or may not be found at an aggregate level (Castro, 2002; Denison, 1996; Glick, 1985). For example, scholars have come to recognize that if a measure of leadership and a measure of performance are correlated at the individual level, they may or may not be correlated when the measures are aggregated to the group or organizational levels. The cross-cultural literature, in contrast to the organizational literature, has attended more to the issue that the *structure of the measures themselves* typically differs depending on whether the measures are constructed based on the correlations among individual-level items or based on the correlations among the items after they have been aggregated to the societal-level (Leung & Bond, 1989). In both literatures, the concern is that relationships found at one level of analysis do not necessarily apply at another. The difference is that the

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organizational literature tends to apply this insight to relationships among measures that were originally designed at the individual level, whereas the cross-cultural literature tends to apply it to relationships among the items that are used to construct the measures. Although both applications are appropriate, the problem of how level of analysis affects measure design is logically prior to the problem of how it affects relationships among measures and neglect of this problem has been a major limitation in the organizational literature about level of analysis. It is the measure design problem that we will address here. The article by Dickson and colleagues in this issue of *Leadership Quarterly* that is based on a major recent multilevel project, the GLOBE Project, as well as a recent book that reports on GLOBE (House, Hanges, Javidan, Dorfman, & Gupta, 2004) begin to address this problem, but both include ambiguities and inconsistencies. The present paper is intended to encourage and help scholars to deal with the issue that just as relationships between predictors and criteria may differ by level of analysis, so may the relationships among items that are used to construct predictors and criteria. We do so by integrating insights from the organizational and cross-cultural literatures to make recommendations about how to effectively handle level of analysis issues in measure design and use the GLOBE project as an example.

First, we briefly summarize the perspective GLOBE has taken to creating scales beginning from data collected at the individual level for use at the organization and nation levels. We then review the way aggregation issues have been handled in the organizational culture and societal culture literatures. Next, we draw from a recent article in *Leadership Quarterly* and the GLOBE book, particularly chapter 8 (Hanges & Dickson, 2004) to summarize how the GLOBE group has drawn from these literatures to design aggregate measures. We note ambiguities and apparent inconsistencies in the description of GLOBE's measure development process. In order to both further clarify how the level of analysis issues addressed in the organizational and cross cultural literatures can be best integrated, we specify three approaches to constructing aggregate measures. We conclude by applying these three approaches to organizational research, cross-cultural research, and the GLOBE project.

2. Measure development in GLOBE

GLOBE deals with three major topics — leadership, organizational culture, and national culture (House et al., 2004). In designing measures, it draws from two internally consistent ways to develop and justify aggregate measures that are derived from individual level responses to surveys (Hanges & Dickson, 2004, pp. 133–136). One approach is found in organizational culture and climate research. This approach is to create scales based on psychometrics that are meaningful at the individual level, then aggregate the scales to a target level. That is, scholars first develop concepts and apply factor analyses, reliability estimates, and other scale evaluation methods to the individual level items. As detailed below, they then apply r_{vg} , ICC(1), ICC(2), WABA, or ANOVA on the individual level scales to justify aggregating them to the group, organization, or nation level. The result of this approach is that it identifies individual level constructs that have enough consistency within aggregate units (e.g., group, organization, or nation) and enough variability across aggregate units to make the analysis of aggregate means worthwhile. The second approach is frequently found in cross-cultural studies that are designed to create societal-level culture dimensions. This approach that Hofstede (1980, 2001) suggested, Leung & Bond (1989) developed further, and Triandis et al. (1993) and Schwartz (1994) follow is to create scales based on the data structure that results after items have been aggregated to a target level. That is, researchers first aggregate items to the target level and then do factor analyses and other scale evaluation at the target level. The differences between creating measures based on the data structures at individual and societal levels are typically substantial. For example, Leung & Bond (2004) argue that five factors are appropriate for their data about causal beliefs at the individual level, but only two are appropriate at the nation level.

While we see evidence that the GLOBE project considered both of these approaches, we have questions about the way the GLOBE project has used and presented these approaches. In so doing, we support the unusual potential of GLOBE's research design not only to use both of these approaches for different purposes, but also to combine them in a third unique way to design organizational and societal culture measures. This third approach, as detailed below, is to create measures at the individual level as in the first approach, then to aggregate the scales to the target level, and finally to create new scales based on relationships among these aggregated scales that were originally created based on the individual-level data structure. We give an example of how this might be done based on societal culture scales provided by the GLOBE project. This potential for a third alternative to designing aggregate measures provides GLOBE and other large scale survey projects with an opportunity to contribute to research about both organizational culture and national culture.

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