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COMMON METHOD VARIANCE IN IS RESEARCH: SHOULD WE BE CONCERNED?

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Abstract

Many IS manuscripts obtain data through the use of self-reports. However, self-reports have inherent problems and limitations, most notably the problem of common method variance. Common method variance refers to unintended effects on the construct of interest – that is, effects that are not related to true trait variance or error variance. Common method variance can cause researchers to find a significant effect, when in fact, the true effect is due to the method employed. This research-in-progress proposes to examine published research in leading IS journals to determine if common method variance is a problem in IS research and if IS researchers have tested for common method variance. As an initial test, the 1999 issues of MIS Quarterly were examined. Of the 9 articles using self-reports to obtain data, only 1 of the articles explicitly mentioned common method variance. Further analysis of 2 years of publications in MIS Quarterly, Journal of Management Information Systems, and Information Systems Research will more fully assess how IS researchers are handling common method variance. Suggestions for testing for and overcoming common method variance will also be provided.

Introduction

Self-reports are often necessary to obtain an estimate of latent variables, and in fact, many IS researchers employ self-reports to gather data. However, self-reports have inherent problems that must be addressed to assure that the results are due to the predicted effect and not due to common method variance. Common method variance is only one part of the measured variance. The total measured variance includes 3 components: trait variance, common method variance, and error variance. Trait variance includes all of the variance associated with the construct of interest. Common method variance includes the variance associated with all other systematic influences on the construct of interest, while error variance is simply the random, unsystematic error of measurement.

When self-reports are used, common method variance can be a serious problem and can, in fact, cause the researcher to find a significant effect, when the only real effect is due to the method employed. Organ and Ryan (1995) note that a significant problem with self-reports may be the instability of correlation. Situational and temporal moderators may then become factors in the accuracy of the results. These problems are particularly relevant to IS studies, which often use self-reports to gather data on system usage. Studies have shown that new models are needed to more accurately assess how people respond to frequency questions (Blair and Burton 1987) and that IS researchers themselves do not generally agree how system usage should be measured (Straub et al. 1995).

Although a substantial number of IS articles use self-reports to measure latent variance, few test for common method variance. However, some IS researchers have specifically discussed and attempted to overcome problems associated with common method variance. First, Igbaria et al. (1997) tested for common method variance using the one-factor test, as recommended by Podsakoff and Organ (1986). Since the results showed a 7-factor model accounting for a substantial portion of explained variance, they determined that common method variance was not a problem in the study. Second, Taylor and Todd (1995) based system usage on a report that an attendant completed, which noted the time of computer use. With the objective data used in the study – as opposed to self-reports of usage – the model only explained 17-21% of the variations in user behavior. Third, Szajna’s (1996) study compared actual usage to self-reports of usage over a 15-week period in which e-mail was introduced. Her study showed that self-report data was not a valid substitute for objective data, and she suggested using other methods to measure system usage. Other IS studies do mention potential problems with self-reports, but few explicitly check for the presence of common method variance.
Although many IS researchers have ignored the potential problems associated with common method variance, researchers from other disciplines have not. For example, Organ and Ryan (1995) completed a meta-analysis of 55 studies of the relationship between job satisfaction and organizational citizenship. Using the one-factor test, they found that the most significant moderator of the correlations was the use of self-reports. Similarly, using the one-factor method, Johns et al. (1992) found a potential problem with common method variance when testing a sample of job characteristics and attitudes. Further, Williams et al. (1989) used confirmatory factor analysis to test for the presence of trait, method, and error variance. They found that, in some studies, common method variance accounts for approximately 25% of explained variance.

There are, however, some studies that indicate that common method variance may not be a serious problem. For example, Schmit and Allscheid (1995) estimated the effect of common method variance by using Podsakoff and Organ’s (1986) recommendations to randomly split an aggregated sample and then correlate the different variables across groups. Their study found little difference between cross-validated models of employee attitudes and customer satisfaction, modeled both with and without common method variance.

Should IS researchers be concerned about common method variance? Is common method variance even a problem in IS research? This study proposes to examine published research in leading IS journals to determine if common method variance is a problem and if researchers have tested for common method variance.

Study Methodology and Progress

As an initial step, this study examines the research published in the 1999 issue of MIS Quarterly. During 1999, MIS Quarterly published 27 manuscripts, with 9 of those studies using self-reports to gather data using questionnaires. Most of these studies did attempt to increase validity, reliability, and generalizability, for example, by using longitudinal designs (Burke 1999; Compeau and Higgins 1999), conducting qualitative assessments in conjunction with self-reports (Brown 1999; Burke 1999; Reich and Kaarst-Brown 1999; Weill 1999), discussing statistical power analyses (Nambisan and Agarwal 1999; Venkatesh 1999), and assessing non-respondent bias (Compeau and Higgins 1999; Karahanna and Straub 1999; Nambisan and Agarwal 1999; Venkatesh 1999). However, only 1 of the 9 studies explicitly mentioned common method variance. In that study, Nambisan and Agarwal (1999) completed a one-factor test and determined that common method variance was not a problem in the study. Clearly, common method variance could have been a significant factor in the effects discussed in the other studies. We are unable to determine if the effect was caused by true variance or the [common] variance in the method employed.

Study Completion

To complete the study, empirical research in three top IS research journals (MIS Quarterly, Journal of Management Information Systems, Information Systems Research) over a 5-year period (1996-2000), will be analyzed. Methods of testing for and overcoming common method variance will be discussed.

References


