



# Advancing PR measurement and evaluation: Demonstrating the properties and assessment of variance-based structural equation models using an example study on corporate reputation



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## ABSTRACT

This paper aims to add to the growing discourse on methods in public relations research by showing how variance-based structural equation modeling (PLS-SEM) can be used to analyze effects between multiple intangible target constructs in PR. We introduce the properties of the method, compare it to conventional covariance-based SEM, and demonstrate how PLS-SEM can be applied to public relations evaluation using an example study on organizational reputation and its effects on trust, and stakeholder behavior ( $n = 1892$ ). This paper offers a consequent methodological discussion of PLS-SEM and provides a valuable resource for public relations research aiming to apply the variance-based approach.

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## 1. Introduction

After more than three decades of research, public relations scholarship has come a long way in developing an academic identity and becoming an independent field (Sisco, Collins, & Zoch, 2011; Smith, 2012). However, to further establish and consolidate the field within the wider domain of communication, research progress is needed both in terms of theory and research methodologies, as well as in researcher's continuity and stringency in applying these approaches (Pasadeos, Berger, & Renfro, 2010; Pasadeos, Lamme, Gower & Tian, 2011). Accordingly, the properties and application of available methods in public relations research is a topic in high need of discussion. Researchers have started to address this topic by reviewing and evaluating the application of widely used methods (Cutler, 2004; Pasadeos et al., 2011) and systematically introducing new methodological approaches to the field (Everett & Johnston, 2012).

In the context of PR measurement and evaluation, with its current need for advancing methods for assessing PR outcomes (Amec, 2010), such discussions are especially promising. Measuring and evaluating outcomes (such as image, reputation, trustworthiness, or legitimacy) is a demanding task since these target constructs are no manifest phenomena, but rather complex intangibles that have to be defined, specified and operationalized carefully to produce meaningful results. If conceptualized with multiple dimensions, the constitution of these constructs yet involves various interrelated latent/emergent

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variables. Furthermore, from an evaluation standpoint, merely descriptive analyses of an organization's image or reputation cannot explain what public relations scholars ultimately want to know, which is: how exactly these constructs contribute to the building of trust-based relations, the facilitation of favorable stakeholder behavior, or even the creation of economic value added for a respective company. Without taking into consideration a wider *network* of relationships, it is not possible to fully evaluate the importance of an organization's image and reputation.

A powerful statistical technique for analyzing such networks of relationships is structural equation modeling (SEM) (Bagozzi & Fornell, 1982). The common and widely used method to apply SEM adheres to confirmatory covariance-based procedures (CB-SEM) for testing causal models. A complementary method to CB-SEM is the variance-based approach of partial least squares structural equation modeling (PLS-SEM) which has an exploratory focus and allows for more modeling flexibility than the CB-SEM approach (Tenenhaus, Vinzi, Chatelin & Lauro, 2005; Wold, 1982). Due to the latest analyses of PLS properties (e.g., Reinartz, Haenlein, & Henseler, 2009) as well as newly emerging techniques for estimating PLS models (e.g., Henseler, 2012), the understanding of the approach has much increased in recent years. Because of these advances, PLS-SEM is currently attracting much attention in business research disciplines such as marketing and management research (Hair, Sarstedt, Ringle, & Mena, 2012; Hair, Sarstedt, Pieper, & Ringle, 2012; Henseler, Ringle, & Sinkovics, 2009). In the field of communication a meta-search via *EBSCO Communication Abstracts* using the keywords “partial least squares” and “PLS” identifies a total of 83 studies between 1986 and 2015. Public relations research, as a communication domain, however, has so far not taken much advantage of the latest advances in PLS-SEM: A meta-search of the six leading international PR journals<sup>1</sup> using the same keywords identifies only two research papers; which refrain from demonstrating the specific advantages of the approach for PR research. This is surprising given that, as we argue below, the particular properties of the PLS approach allow to address some of the current challenges in public relations research, especially when it comes to questions of evaluation involving multiple intangibles or models which are not yet fully confirmed and standardized.

In this paper, we aim to show how the statistical technique of PLS-SEM can be gainfully applied to public relations research for predicting relations between intangible target constructs. We introduce PLS-SEM and show its properties as a variance-based approach to structural equation modeling, highlighting the method's complementary nature and differences to CB-SEM. To demonstrate the application of the method in the context of public relations research, we then provide a step-by-step assessment of PLS path model results using an evaluation study with survey data ( $n = 1892$ ) on corporate reputation and its effect on trust and stakeholder behavior. In the concluding section we summarize and discuss how PLS-SEM can enrich future research in the field of public relations evaluation both statistically and conceptually.

## 2. Properties of PLS-SEM and its differences to CB-SEM

Structural equation modeling (SEM) combines elements of regression and factor analysis to assess causal relations between multiple intangible constructs in a single and comprehensive analysis while explicitly accounting for measurement error. Thus, the technique is extremely helpful in making sense of data using appropriately complex models. In SEM, such models consist of two general components: First, the *structural model*, which represents the hypotheses on how the different intangible constructs affect each other. As such, structural models comprise two types of constructs: Those constructs that affect/explain the variance of other constructs in the model (called exogenous variables) and those constructs that are dependent, i.e., affected by other constructs in the model (called endogenous variables). Statistically estimating structural relations between these variables requires the respective constructs to be operationalized using observable variables (indicators). Thus, the second component of SEM models consists of the *measurement models* used to empirically assess the intangible constructs. Fig. 1 shows a graphic example model with two exogenous and two endogenous variables (represented by the four circles), their hypothesized relations (represented by the directed arrows, or ‘paths’, in the structural model), and indicators (represented by the boxes) used to measure the different constructs.

Structural equation modeling is particularly useful in public relations research when researchers need to analyze interrelations between multiple key concepts that are not directly observable. In recent years, there has been a substantial number of studies that apply SEM in public relations (cf. De Bussy & Suprawan, 2012; Kim & Niederdeppe, 2013; Chen, 2013; Chung, Lee, & Heath, 2013; Jiang, 2012; Weberling & Waters, 2012; Ki, 2013; Song, Kim, & Han, 2013; Lee & Hong, 2012). So far, however, most researchers associate SEM solely with the covariance-based procedures (Jöreskog, 1978). Due to concerns regarding the informational and distributional requirements of CB-SEM approaches and their fixed emphasis on theory testing (Wold, 1982), PLS-SEM was developed as a complementary method to the strictly confirmatory and fitting-based approach of CB-SEM (Jöreskog & Wold, 1982).

Generally speaking, PLS-SEM is a causal modeling approach, which aims at maximizing the explained variance of the endogenous variables in a model. Unlike CB-SEM procedures, structural equation modeling with PLS is based on the regression principle using ordinary least squares (OLS) to explain variance (Fornell & Bookstein, 1982). The estimation is based on principal component analysis and no distributional assumptions are required of the data. Thus, other than in CB-SEM, the manifest variables must not necessarily be distributed multi-normally. As a consequence, there is no global measure of model validity available, but standard errors can be calculated for the estimated model parameters using bootstrapping as

<sup>1</sup> Public Relations Review (1), Journal of Public Relations Research (0), Journal of Communication Management (1), International Journal of Strategic Communication (0), Public Relations Inquiry (0), Public Relations Journal (0).

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