ORGANIZATIONAL FACTORS FOR SUCCESSFUL IMPLEMENTATION OF INFORMATION SYSTEMS: DISENTANGLING THE EFFECT OF TOP MANAGEMENT SUPPORT AND TRAINING

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ABSTRACT
Systems implementation is an important topic, and numerous studies have been conducted to identify determinants of success. Among organizational factors that have been theorized to have an impact on success, top management support and training are two of the most widely studied. While the positive influence of both of these organizational factors is generally recognized, their effect has been characterized as situational; i.e., the effect may be moderated by other variables. Other researchers have contended that varying effects observed in different studies are caused by nothing but statistical artifacts. Still, another reason for the inconsistent results could be how the two variables are modeled. In this research, we propose to investigate different models of top management support and training using data collected from an extensive list of prior studies. The most plausible model will be identified using meta-analytical procedures. The validated model will have implications for both systems implementation practice and research.

Keywords  
Systems implementation, systems success, top management support, training, meta-analysis

INTRODUCTION
Implementation of information systems is usually resource intensive, but the results are often less than satisfactory. The industry is full of horror stories where, after spending millions of dollars and enduring protracted delay, organizations are forced to abandon an IS project. Even if a system is delivered on time and within budget, it is not guaranteed that it will be used or liked by its intended users; nor will it achieve the expected benefits. Numerous studies have been devoted to finding factors that contribute to the success of information systems implementation. Among the factors that have been most extensively investigated, top management support has usually been found to play a critical role in the project outcomes (Ifinedo, 2008). Some researchers even claim that top management support is the most critical factor to systems implementation success (Young and Jordan, 2008).

However, not all empirical evidence supports the critical role of top management support (Dong et al., 2009). Sharma and Yetton (2003, 2011) attempted to explain the inconsistent literature by examining the moderating effect of task interdependence on top management support. They assert that top management support is critical when task interdependence is high, but “a relatively weak and probably not critical component when task interdependence is low” (Sharma and Yetton 2003, p. 545). A more recent meta-analysis, however, found that top management support is equally effective in both high and low task interdependence groups (Hwang and Schmidt, 2011). Is the effect of top management support universal as reported by Young and Jordan (2008) and Hwang and Schmidt (2011) or situational as asserted by Sharma and Yetton (2003, 2011)? The answer has important implications for both IS implementation practice and research.

Another organizational support variable that has received a lot of attention is training. Similar to top management support, the positive effect of training has been widely recognized. Also similar to top management support, the effectiveness of training has been challenged. In another meta-analysis, Sharma and Yetton (2007) concluded that the effect of training is contingent on both technical complexity and task interdependence. The rationale for the two meta-analyses of Sharma and Yetton (2003, 2007) is that empirical evidence on the effect of top management support and training is inconsistent. Consequently, a moderator such as task interdependence or technical complexity is tested in a contingency model to explain...
the inconsistent results found in the literature. The opposing view of Hwang and Schmidt (2011) is that variance in research findings on top management support is, for the most part, artifactual rather than a function of task interdependence. The current research seeks to shed light on the debate by analyzing results from prior studies where both top management support and training were examined in the same study. Specifically, the interaction between top management support and training is investigated in different models of IS implementation success. The objective is to develop a better understanding of the role played by top management support and training in IS implementation projects.

LITERATURE REVIEW

In a meta-analysis of organizational and individual determinants of IS success, Sabherwal, Jeyaraj and Chow (2006) reviewed 121 studies published from 1980 to 2004. Table 1 summarizes their findings.

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Number of studies</th>
<th>System quality</th>
<th>Perceived usefulness</th>
<th>User satisfaction</th>
<th>System use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support</td>
<td>37</td>
<td>0.18</td>
<td>0.34</td>
<td>0.34</td>
<td>0.24</td>
</tr>
<tr>
<td>Facilitating conditions</td>
<td>35</td>
<td>0.20</td>
<td>0.20</td>
<td>0.30</td>
<td>0.18</td>
</tr>
<tr>
<td>User experience</td>
<td>32</td>
<td>0.31</td>
<td>0.29</td>
<td>0.17</td>
<td>0.35</td>
</tr>
<tr>
<td>User training</td>
<td>31</td>
<td>0.25</td>
<td>0.23</td>
<td>0.19</td>
<td>0.24</td>
</tr>
<tr>
<td>User attitude</td>
<td>38</td>
<td>0.43</td>
<td>0.50</td>
<td>0.37</td>
<td>0.32</td>
</tr>
<tr>
<td>User participation</td>
<td>36</td>
<td>0.24</td>
<td>0.34</td>
<td>0.37</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Table 1. Organizational and Individual Determinants of Systems Success

As shown in Table 1, all the determinants are relatively well studied. Since a given study may include multiple independent variables, some of the studies in column two overlap. The remaining columns display the mean effect size (in correlation) using four common systems success measures. The positive effect of these factors on systems success is consistent with most of the IS literatures. However, the effect size found in any given study may differ from the mean effect size. Are those differences due to statistical artifacts (Hwang and Schmidt, 2011) or the result of moderator variables (Sharma and Yetton, 2003, 2007)?

Another potential reason for varied results found across studies is how the variables are modeled. In a study where two or more independent variables are investigated, say, top management support and training, their effects may be modeled in at least three different ways as illustrated below:

![Figure 1. Direct Effects Model](image)
Top management support

Training

Implementation success

Figure 2. Moderator Effects Model

Top management support

Training

Implementation success

Figure 3. Mediational Model

Figure 1 illustrates a direct effects model where the two independent variables exert a direct and non-overlapping effect on the dependent variable. This straightforward model has been the dominant choice in prior studies (e.g., see Sanders and Courtney, 1985; Santhanam, Guimaraes and George, 2000). Unlike the direct effects model, where the two independent variables are assumed to be orthogonal, the moderator effects model assumes that the two independent variables interact in a way that one variable moderates the effect of the other variable. Figure 2 illustrates that training may moderate the effect of top management support. It should be noted that it is also possible that top management support may moderate the effect of training, hence switching their respective roles in Figure 2. Finally, a mediational model, as illustrated in Figure 3, suggests that the effect of top management support is mediated by that of training. Figure 3 shows that the direct effect of top management support is only observable on training. In other words, the effect of top management support on implementation success is totally mediated by training. This is known as a full mediational model. It is also possible that some direct effect from top management support on implementation success can still be observed, resulting in a partial mediational model. Another variation of Figure 3 is switching the roles of top management support and training, whereby the former mediates the effect of the latter.

METHODOLOGY

Meta-analysis will be used to test the various models identified in the previous section. The sample will consist of previous implementation success studies that included both top management support and training as independent variables. As is common in meta-analysis, a comprehensive literature search will be conducted using databases such as ABI/INFORM, Science Direct, Sociological Abstracts, and Dissertation Abstracts. Using keywords such as systems implementation, systems success, top management support and training, potential studies will be identified. Abstracts of these studies will be examined and full text articles located for those that are suitable for meta-analysis.
Another source for potential studies is the bibliography sections of the studies located above. Review or theoretical studies that are not suitable for meta-analysis can also be sources for identifying additional studies. It is expected that the computer keyword searches and manual review of bibliographies will produce a comprehensive list of studies that can be used for model testing using the procedure discussed below. Studies that are candidates for inclusion in the meta-analysis are identified with an asterisk in the references.

Direct Effects Model
In a direct effects model, it is assumed that top management support and training act independently of one another on implementation success. Based on theories and most existing studies, a positive correlation between top management support and implementation success and a positive correlation between training and implementation success are expected, lending support to the direct effects model. On the other hand, the correlation between top management support and training should be non-significant if the two variables exert a truly independent effect on implementation success. A non-trivial correlation (positive or negative) between top management support and training will suggest that other models (moderator effects or mediational) are more appropriate.

Moderator Effects Model
In a moderator effects model, an independent variable interacts with a second independent variable to affect the relationship between the latter and the dependent variable. As illustrated in Figure 2, if training is a true moderator, the effect of top management support on implementation success will vary depending on the level of training. A strong effect of top management support on implementation success may be associated with a high (or low) level of training.

Testing of moderator variables has become increasingly popular in meta-analyses conducted by IS researchers (Hwang and Schmidt, 2011; Petter and McLean, 2009). One common approach is regressing the potential moderator (e.g., training) on the correlation between the independent variable (e.g., top management support) and the dependent variable (implementation success). If the regression model is significant, it is inferred that the moderator is operating. Even though this approach is intuitive and popularly used in many meta-analyses (e.g., Sharma and Yetton 2003, 2007; Wu and Lederer, 2009), it has severe limitations (Hwang and Schmidt, 2011). As a result, Hwang and Schmidt (2011) recommend comparing credibility intervals of subgroups based on the moderator variables. In this research, both the regression analysis and the subgroup analysis recommended by Hwang and Schmidt (2011) will be used to test for the moderating effect.

Mediational Model
The procedure described by Viswesvaran, Sanchez, and Fisher (1999) will be used to test for mediational effects. In this procedure, pairwise correlations between the three variables (i.e., top management support, training, and implementation success) will be calculated first. Support for a full mediational mode as illustrated in Figure 3 is obtained if the partial correlation between top management support and implementation success drops to zero after partialing out the effect of training. If the partial correlation between top management support and implementation success decreases to a nonzero amount after partialing out the effect of training, support for a partial mediational model is found. Finally, if the partial correlation between top management support and implementation success does not drop after partialing out the effect of training, the mediational model is not supported. In sum, the pairwise correlations between the three variables will be cumulated in this meta-analysis. Then, partial correlation analysis will be conducted to determine if a full or partial mediational model is supported.

CONCLUSION
Systems implementation is an important topic, and numerous studies have been conducted to investigate the effects of various determinants of success. Although top management support and training have generally been recognized as critical success factors, their positive effects are not always borne out in empirical data. The inconsistent results could be caused by how the two variables are modeled. In this research we propose to examine different models of top management support and training using meta-analytical procedures. The most plausible model will be identified by meta-analyzing data collected from an extensive list of prior studies.

REFERENCES