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# Management of Change to Ensure IS Success: A Longitudinal Study

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# Management of Change to Ensure IS Success: *A Longitudinal Study*

*Completed Research Paper*

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## Abstract

*This paper aims to understand the effect of management of change on the success of information system (IS) implementation. Drawing on change management research and self-determination theory, a research model is developed. Data collected from a longitudinal field survey before, during, and after an enterprise-wide IS implementation are analyzed to test the proposed hypotheses. The results indicate that management of change can be used to increase readiness for change and end-user computing satisfaction during and after the implementation. Readiness for change positively impacts satisfaction during an implementation but not after. Contrary to the literature, No significant relationship exists between resistance to change and satisfaction. The paper contributes to IS research and practice by drawing attention to the importance of management of change and readiness for change for IS success.*

**Keywords:** Change management, End-user computing, IS success, IS implementation, Longitudinal research, Organizational change, User satisfaction

# Introduction

It is important to achieve successful implementation when investing in a new enterprise-wide information system. Management must manage the change process to successfully integrate the new technology into the organization (Xue et al. 2009). The system implementation must be managed both as a technological innovation and an organizational change. Important aspects of a new implementation are user comparison of the new system to the old one it replaces, user readiness for and/or resistance to change, and user satisfaction with the new system. Individuals evaluate change for the expected outcome and then decide to either react favorably or resist (Joshi 1991). Change strategies that can overcome resistance and create readiness will assist in successful implementation (Piderit 2000; Shang and Su 2004). Change management strategies include communication, training, management support, and technical resource availability (Caldwell et al. 2004, Herold et al. 2007, Martins and Kellermanns 2004) ). In accordance with self-determination theory, an autonomic-supportive environment with timely, effective communications and training can serve to internalize the external motivation for the IS implementation (Baard et al. 2004; Kirner 2006). Such change management helps achieve the success of an IS implementation, indicated by user satisfaction with the system, the information generated by the system, and its ease of use (Venkatesh and Davis 1996).

Managers may believe that they are being supportive in communication, but are unaware of the perceptions and attitudes of their employees at the operational level (Bonvillian 1997). Managers need instruments to identify implementation issues early on and to adjust the management of change process so as to better achieve a successful implementation by reducing resistance and increasing readiness to accept system changes. This study seeks to address this gap of knowledge by testing a model that posits relationships among management of change, readiness for change, resistance to change, and end-user computing satisfaction. An anonymous survey instrument can be used to collect candid feedback for management to adjust the management of change strategies and process to improve user satisfaction and implementation success.

Change is a process (Orlikowski and Hofman 1997). Hence, change management and its impacts should be studied along with the change and preferrably pre-, during, and after a change. This research investigates the relationships among users' perceptions of management of change effectiveness(MOC), readiness to change (REA), resistance to change (RST), and end-user computing satisfaction (EUCS) at the three points in time of an IS implementation: 1) after a decision is made about a new IS implementation but before its initiation; 2) during the implementation after the first major modules are implemented; and 3) after the entire implementation is complete and the new system is already in use for a while.

Although much research has been conducted on MOC, REA, RST, EUCS, and their respective relationship with one another, no research has looked closely inside the change management process and explicitly examined the relationship among all of them longitudinally. Venkatesh and Davis (2000) is the only known relevant longitudinal study, however, their study mainly captured snapshots of use characteristics at three time frames and did not introduce any process measures for the change. They tested technology acceptance in both mandatory and voluntary settings by measuring use intention and actual use. This research, however, studies only the mandatory use of technology, and argues that EUCS is a better measure for true technology acceptance in mandatory settings rather than use intention and actual use. In mandatory settings, use intention can be influenced by compliance requirements (Xue et al. 2009) and the actual use depends on the role, needs, and the proficiency of the user. Therefore, user satisfaction with the system is a better indication of the system success than use intention and actual use.

Extant research has examined the impacts of both resistance and readiness on system success (Gagne, Koestner and Zuckerman 2000; Gagne and Deci 2005; Kwahk and Lee 2008; Piderit 2000; Self and Schraeder 2009) but with inconclusive results. It is unclear whether or not readiness and resistance are simply the reverse of each other. This study seeks to examine if they are both important antecedents of user satisfaction, and if not, which one plays a more prominent role.

The rest of the paper is organized as follows. Section II introduces the research model and the hypotheses. Section III describes the survey research process and reports the results of the data analysis. Section IV discusses the major findings and their implications for research and practice. Section V concludes.

# Theoretical Development

## *Research Model*

Figure 1 presents the management of change research model. Management of change is critical to the success of IS implementations. It is important to understand the effects of change management on creating readiness and overcoming resistance in order to improve end-user satisfaction.

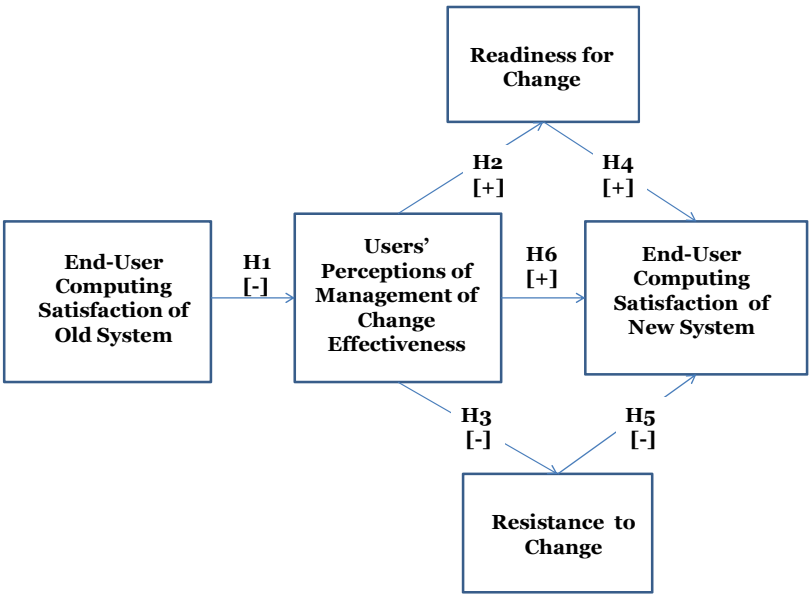


Figure 1. Management of Change Research Model

End-user computing satisfaction of the old system is expected to negatively affect the users' perception of management of change effectiveness for the new system. Perception of management of change effectiveness is expected to positively impact user readiness for change and end-user computing satisfaction of the new system, but negatively impact resistance to change. Readiness for change is expected to positively impact satisfaction with the new system, whereas resistance to change is expected to negatively influence satisfaction.

## *Management of Change*

Management should dynamically use strategies and techniques to introduce and facilitate an organizational change. Self-Determination Theory suggests that management of change must motivate employees by creating a work climate that satisfies basic psychological needs to enhance intrinsic motivation. A person acts to achieve a desired, or to avoid an undesired, consequence (Baard et al. 2004). In order to manage change effectively, information must be shared with employees and employees' concerns must be addressed as they surface (Parker 2009). Providing a meaningful rationale for doing the task, acknowledging that people might not find the activity interesting, and emphasizing choice rather than control, are change management strategies that promote internalization and satisfaction (Deci et al. 1994; Gagne and Deci 2005). Empathy and concern, two elements of communication, are also conducive to satisfaction of organizational change and apply to management of change during enterprise-wide implementations as well (Gagne el al. 2000; Gagne and Deci 2005; Kirkpatrick 1985). Our research explores the users' perceptions of management of change effectiveness (MOC). The MOC construct is an

evaluative response representing the users' perception of how effectively management has employed the strategies involving communication, support, fairness, technical availability, and training.

### *Readiness for change and resistance to change*

Readiness for change is related to one's attitude toward change and the individual's belief of how others view their attitude toward change (Kwahk and Kim 2009). This study adopts the definition of "readiness collectively reflects the extent to which an individual or individuals are cognitively and emotionally inclined to accept, embrace, and adopt a particular plan to purposefully alter the status quo" (Holt et al. 2007, p. 235). Readiness is reflected in organizational members' beliefs, attitudes, and intentions regarding the need and the organization's capacity to implement changes. Strategies of the management of change, change agent credibility, and interpersonal and social dynamics are important in the readiness creation process. Readiness creation is often discussed in conjunction with prescriptions for resistance reduction (Piderit 2000).

Kwahk and Kim (2008) cited resistance to change as a contributing factor to high failure rates of new enterprise-wide implementations. Resistance has been defined as any conduct that tries to keep the *status quo*, i.e., resistance is equivalent to inertia, as the persistence to avoid change (Maurer 1996). Oreg (2003) defines it as an individual's tendency to resist or avoid making changes, to devalue change generally, and to find change aversive across diverse contexts and types of change. This study adopts the definition of resistance as a generalized opposition to change engendered by the expected adverse consequences of change (Bhattacherjee and Hikmet 2007). Negative behaviors are related to resistance, which can occur at any stage in implementation (Cooper and Zmud 1990). Innate resistance to change, lack of involvement in the change process, lack of management support, poor system quality, and the lack of designer-user interaction have all been identified as factors causing resistance (Hirscheim and Newman 1988).

### *End-user computing satisfaction*

IS benefits are sometimes intangible, and hence, user satisfaction is utilized as a surrogate measure of IS performance (DeLone and McLean 2003; Straub 1989). A survey of management's sensitivities to user needs, participation, and communication is often used to examine satisfaction as a measure of how well the change is being managed (Davis 1989). Past definitions of user satisfaction have included "felt need," "system acceptance," "perceived usefulness," "MIS appreciation," "feelings" about a system (Ives, Olson and Baroudi 1983) and, more generally, "attitudes and perceptions." Specific definitions for the related constructs range from the "extent to which users believe the information system available to them meets their information requirements" (Ives, Olson and Baroudi 1983) to the "manifold of beliefs about the relative value of the MIS" (Swanson 1974). These definitions have some form of evaluative response in common (Melone 1990).

This study adopts the user satisfaction definition as end-user computing satisfaction, that is, how much users are satisfied with: the system; the information generated; and ease of use (Chin and Lee 2000).

### *Hypotheses*

This research explores the relationship among management of change, readiness for change, resistance to change, and end-user computing satisfaction pre-, during, and after a new IS implementation.

It is assumed that users who are already satisfied with the old existing information system will not be motivated to use a different information system. These users will be less collaborative in the change process. Those users who are dissatisfied with the old system should welcome the change which results in a more favorable perception of management of change to the new system. Hence, change management should take into consideration the users' attitudes towards the replaced information system and adjust their strategies accordingly.

***H1.*** *End-user computing satisfaction of the old system negatively affects the users' perceptions of management of change effectiveness for the new system.*

IS researchers also recognize users' acceptance of a system as a major objective of system implementation and the organizational change it entails. Management of change includes strategies like: 1) communication of the need for change; 2) promoting the expected benefits of the new system; 3) management support for the planned change; and 4) training to promote ease of use and to diminish uncertainty (Deci et al. 1994; Gagne and Deci 2005). These strategies aim to inform users the benefits of the change and encourage them to favorably respond to the change. Bentley's (2005) seventh prerequisite for successful implementation is Education which he defines as the ability to understand the solution (technology), why the business needs it, how the technology will work, what one can expect from it, and what changes it will require. These objectives are attained through communication and training to establish realistic users' expectations. As discrepancy is created in users' minds between the old system and the new, they become more ready to accept the change. They will be better prepared for the change and minimize the dissonance between their expected benefits and realized benefits. High ratings on MOC should result from effective efforts to prepare users to accept the change.

***H2.*** *Users' perceptions of* m*anagement of change effectiveness positively affect readiness for change.*

Understanding and effectively managing resistance are important determinants of the system success (Jiang et. al, 2000). Resistance to change can be managed by communicating the rationale for the change (Deci et al. 1994; Gagne and Deci 2005). Resistance is reduced as the ease of using the new system and the expected utilization benefits are enhanced. If a user's perception of the management of change effectiveness is high, then it is expected that the user's resistance to change will decrease. Low MOC measurements would indicate a negative opinion of change management effectiveness, which increases user resistance.

***H3.*** *Users' perceptions of* m*anagement of change effectiveness negatively affect resistance to change.*

Kwahk and Lee (2008) found that readiness for change had an indirect, positive effect on behavioral intention to use an enterprise-wide system through the influences of perceived usefulness and perceived ease of use, both important causal antecedents of acceptance/satisfaction according to Venkatesh and Davis (1996). Venkatesh and Davis (2000) suggested that interventions to increase the comparative effectiveness between the new and old systems may produce increased leverage to promote user acceptance/satisfaction. Training impacts the user's belief regarding both ease of use and usefulness and is one management strategy to create readiness to prepare users to accept the change (Venkatesh and Davis, 1996). If creating readiness has a positive effect on perceived usefulness and ease of use then it should increase user satisfaction which indicates a successful implementation.

***H4.*** *Readiness for change positively affects end-user computing satisfacton of the new system.*

Changes that are considered favorable are not resisted and may even be sought after and welcomed, while changes considered unfavorable are likely to be resisted. More resistance deters internalization of the benefits of change and reduces satifaction with the change. MIS researchers recognize that better theories or models of user resistance would lead to better implementation strategies and desired implementation outcomes (Joshi 1991)**.** Overcoming resistance should lead to greater end-user computing satisfaction.

***H5.*** *Resistance to change negatively affects end-user computing satisfaction of the new system.*

Change management is critical to successful IS implementation. Top management support, business involvement, communication, and training are important factors in managing change successfully in IS systems (Shang and Su 2004). Many researchers have been interested in how to promote user satisfaction for successful implementations (Chau 1996; Davis 1989; Igbaria et al. 1997; Venkatesh and Davis 2000). The level of satisfaction depends on the motivation and ability to change (Judson 1991; Kotter 1995; Lewin 1951). Motivating factors and enabling factors influence user satisfaction. Change motivators, such as the explanation of realized benefits, positively influence perceived usefulness. Change enablers, such as training, positively influence perceived ease of use of the system (Martins and Kellerman 2004; Venkatesh et. al 2000). It is recognized that satisfaction can be enhanced by giving managers a tool to "proactively design interventions targeted at populations of users that may be less inclined to adopt and use new systems" (Doll 2004, p.426). An instrument that helps managers to identify weak areas in change strategies can help promote user satisfaction. It is expected that as the perception of the effectiveness of the change management increases so will the user's satisfaction with the system.

***H6.*** *Users' perceptions of management of change effectiveness positively affect end-user computing satisfaction of the new system.*

# Methodology

## *Data Collection*

The research design is a longitudinal study with surveys at three points in time, and at each point it is a cross-sectional study using a web-based survey. The research setting is in a small university replacing multiple separated systems with a new, integrated mandatory use information system called the Comprehensive Academic Management System (CAMS). CAMS serves to manage all student information databases with functional modules to interface with admissions, registration, bursar, administration, faculty, student advisors, and students. The information system also includes stand-alone software packages, communication programs, an accounting program, and other software to conduct business functions of a university. CAMS, for this university, is equivalent to an Enterprise Resource Planning (ERP) system for a business.

The data were collected using the survey instrument contained in Appendix A. An additional comment area was added to the end of each survey: "Please comment on any job tasks that have improved or worsened with the change." Data were collected at three times: 1) Pre-implementation (March 2009, referred as Time 1) when the decision of a new system was made, no modules of the new system were introduced, and the old system was in use; 2) During-implementation (November 2009, referred as Time 2) after the key system components (registrar's module and the upgraded integrated course management system) were implemented and in use; and 3) Post-implementation (April 2010, referred as Time 3) after the entire new system was implemented and in operation for a month. When new modules were implemented, the parallel modules in the old system were completely displaced and taken offline except for the old student database, which was only "read" accessible for a short period and was taken offline before Time 2. By Time 3, all modules and integration were complete and the old student records database, email, and un-integrated Blackboard were completely displaced. The survey instrument was modified slightly at each time to reflect some specific needs at that time. Issues identified by the survey comments were forwarded to management as input for adapting change management strategies. Communications from the management, comments on improved workflow enabled by the new IS system, priority changes, or other issues indicated in the survey comments were collected as qualitative data.

The university organization in target groups from administration/staff, faculty, and students responded to the emails soliciting their participations in the survey, which was placed on a controlled access web site. Follow-up emails were sent to maximize the response rates and enable comparison of late respondents to earlier ones. Incentive prize drawings were held after each survey collection period closed. A note at the beginning of the survey explained the purpose of the study and the procedure for handling the data. It was emphasized that the data would be kept confidential and used only for research purposes. All constructs were measured using the survey. To track respondents, each survey was assigned a unique code and respondents did not need to provide their identities on the survey. A list of codes linking the survey to the drawing email address was created to which only the researcher had access.

Despite the limited population size in this small university (approximately 100 faculty, 50 staff, and 1000 students), the response rates for the survey across all three points are consistently satisfying. Initially, 181, 325, and 207 surveys were completed at Time 1, Time 2 and Time 3, respectively. All surveys with greater than 10% N/A (Not Applicable) responses were eliminated. Those with 10% or less N/A responses or missing data were replaced with the average values. The Partial Least Squares (PLS) testing required the same number of cases at each point in time in order to test the common model simultaneously. Time 1 retained 145 cases, which determined the number for the other two points. Time 2, after stringent elimination, still exceeded 145 cases and random number generation was used to eliminate cases to the required level. Table 1 indicates the sample sizes in each group with a total of 145 at each point in time for data analysis. The descriptive statistics of each group show that samples in each group at each time are representative of the respective population.

| Table 1. Sample Sizes | | | |
|---|---|---|---|
| Group Size | TIME 1 | TIME 2 | TIME 3 |
| Students | 86 | 102 | 87 |
| Faculty | 31 | 23 | 28 |
| Staff | 28 | 20 | 30 |
| Total (N) | 145 | 145 | 145 |

The sample size of 145 in each period satisfies the minimum sample size requirements to generalize results. To determine the minimum sample size, the following factors were considered: the power analysis with power of 0.8 at the 95% confidence level and 0.5 effect size requires a sample size of 102; and SmartPLS requires ten times the number of items measuring a latent variable, which is 120 for this study.

In this study, not all individuals use all modules of the system or perform exactly the same tasks, so the aggregated experience represents the organizational level.

### *Measurement Development*

Four constructs are measured in this study. All instrument items are detailed in Appendix A. Some instrument items are modified at the different data collection periods to specifically refer to the information system under examination at that point. For instance, at the pre-implementation of the new IS system CAMS, the EUCS measurements specifically refer to the old information system composed of fx Scholar, ACT and Response Plus, etc. Questions are carefully worded with proper tense. For instance, MOC measures the users' perceptions of how well change has been managed before the date of the survey, and EUCS measures users' present satisfactions on the date of the survey with the current information system.

The operationalization of users' perceptions of management of change effectiveness (MOC) combines survey items from three existing management of change instruments. It is measured by the users' opinion of fairness, management support (Caldwell et al. 2004), technical resource availability (Martins and Kellermanns 2004), communication, and training (Herold et al. 2007) that have been exhibited by the university's management.

Resistance to change (RST) is measured using four items from the instrument in Bhattacherjee and Hikmet (2007). These items address the general attitudes of users' resistance to change with regard to how they input data, receive reports, interact with others, and general work methods.

Readiness for change (REA) is measured using thirteen items from Kwahk and Kim (2009). These readiness items address the users' general attitude toward change and how others perceive their attitude toward change. Items from Holt et al. (2007) are added addressing perceived benefits to the respondents and organization. Several items are reworded to relate specifically to the context of CAMS while other common issue items are consolidated to render the instrument more concise.

In this study, satisfaction is measured as the extent to which users are satisfied with: the system; the information generated by the system; and the ease of use. It uses the well published instrument of End-user computing satisfaction (Abdinnour-Helm et al. 2005; Aladwani 2002; Doll and Torkzadeh 1988, 1989; McHaney et al. 2002; Somers et al. 2003). The EUCS instrument measures evaluative response for dimensions of content, accuracy, format, timeliness, ease of use and the extent to which the user's needs are being satisfied. Each dimension is measured with Likert scaled responses regarding the user's frequency-based belief that their response is true.

## Data Analysis and Results

The research model depicted in Figure 1 was analyzed using a Partial Least Squares (PLS) path modeling technique. Specifically, the model was tested using linear PLS path modeling as implemented in the freely-available SmartPLS software (Ringle et al. 2005). SmartPLS simultaneously assesses the psychometric properties of the *measurement model* (e.g., the reliability and the validity of the scales used to measure each latent variable construct), as well as the parameters of the *structural model* (e.g., the magnitudes and significance levels of the beta coefficients for each of the paths) between the latent variables.

**Table 2. Descriptive Statistics**

| Group | Construct | TIME 1 | | TIME 2 | | TIME 3 | |
|---|---|---|---|---|---|---|---|
| | | Mean | Std. | Mean | Std. | Mean | Std. |
| Student | MOC | 3.4 | 0.66 | 3.9 | 0.79 | 3.8 | 0.79 |
| | REA | 3.5 | 0.64 | 4.0 | 0.72 | 3.7 | 0.79 |
| | RST | 3.3 | 1.04 | 3.5 | 1.03 | 3.4 | 1.08 |
| | EUCS | 4.0 | 0.80 | 4.2 | 0.62 | 4.2 | 0.64 |
| Staff | MOC | 3.7 | 0.65 | 3.9 | 0.80 | 3.5 | 0.77 |
| | REA | 4.0 | 0.60 | 4.1 | 0.55 | 3.7 | 0.56 |
| | RST | 2.4 | 1.03 | 2.7 | 1.24 | 3.0 | 0.99 |
| | EUCS | 3.1 | 0.93 | 4.0 | 0.44 | 4.0 | 0.62 |
| Faculty | MOC | 3.7 | 0.66 | 3.6 | 0.62 | 3.6 | 0.91 |
| | REA | 3.9 | 0.61 | 4.1 | 0.50 | 3.8 | 0.54 |
| | RST | 2.4 | 1.24 | 2.6 | 1.01 | 2.9 | 1.21 |
| | EUCS | 3.1 | 0.93 | 4.0 | 0.44 | 4.0 | 0.62 |
| Total | MOC | **3.5** | 0.66 | **3.9** | 0.77 | **3.7** | 0.81 |
| | REA | **3.7** | 0.65 | **4.0** | 0.66 | **3.7** | 0.71 |
| | RST | **2.9** | 1.16 | **3.3** | 1.14 | **3.3** | 1.11 |
| | EUCS | **3.6** | 0.93 | **4.1** | 0.6 | **4.1** | 0.63 |

Table 2 shows the descriptive statistics of construct measurements for each group and the total sample size of 145. Note that MOC2 for the total is higher than that of MOC1 as data and comments collected at Time 1 were collated, analyzed, summarized, and forwarded to the management, and the management did improve its strategies accordingly. By providing a feedback loop the survey actually changed MOC in reality in later periods and that may have consequently affected REA and RST. MOC3 unfortunately was rated lower than MOC2, as qualitative comments showed that users were complaining about more than one login into the new system, and the management did not respond promptly and effectively to these complaints. This circumstance was a special case for this particular project only.

It should be noted that at Time 1, students as a group tested higher in end user satisfaction (4.0 vs. 3.1 for both staff and faculty), lower in readiness (3.5 vs. 4.0 for staff and 3.9 for faculty), and greater in resistance (3.3 vs. 2.4 for staff and 2.4 for faculty). Significant differences were found by equal variance T-tests on comparison of path coefficients of student versus non-student data at Time 1. Therefore, MOC1, REA1 and RST 1 were not used in inferential statistical analysis. Prior to Time 1 students were not aware of the introduction of a new system and had not received communication concerning the change. However, staff and faculty had been notified. However, at Time 2 and Time 3, no significant differences exist among the groups. Students were seeing benefits from the integration with the course management

system before data were collected at Time 2. And students had benefitted from the student portal to the student information system before data were collected at Time 3.

### *Measurement Validation*

Reliability results from testing the measurement model with the combined Time 1, Time 2 and Time 3 data are reported in Table 3. The composite reliabilities, Cronbach's alphas, and the average variance extracted (AVE) for each of the first-order latent variable constructs are reported. The data indicate that the measures are robust in terms of their internal consistency reliability as indexed by the composite reliability. The composite reliabilities of the different measures in the model (Dillon-Goldstein's Rho) range from 0.94 to 0.97, which exceed the recommended threshold value of 0.70 (Nunnally 1978). The composite reliabilities all exceed 0.90, indicating excellent internal consistency reliability of each block of indicators for each latent construct. In addition, consistent with the guidelines of Fornell and Larcker (1981), the AVE for each measure well exceeds 0.50.

**Table 3. Assessment of the Measurement Model**

| Construct | Cronbach's Alpha | Composite Reliability | AVE |
|---|---|---|---|
| EUCS1 | 0.97 | 0.97 | 0.76 |
| EUCS2 | 0.95 | 0.96 | 0.64 |
| EUCS3 | 0.95 | 0.96 | 0.67 |
| MOC2 | 0.94 | 0.95 | 0.62 |
| MOC3 | 0.94 | 0.95 | 0.62 |
| REA2 | 0.94 | 0.95 | 0.65 |
| REA3 | 0.93 | 0.94 | 0.63 |
| RST2 | 0.92 | 0.94 | 0.80 |
| RST3 | 0.95 | 0.97 | 0.88 |

Table 4 presents the results of testing the discriminant validity of the measurement scales. The bolded elements in the matrix diagonals, representing the square roots of the AVEs, in all cases are greater than the off-diagonal elements in their corresponding row and column, providing evidence of the discriminant validity of the scales (Fornell and Larcker 1981).

**Table 4. Discriminant Validity (Inter-correlations) of Latent Variable Constructs**

| **Latent Variables** | EUCS1 | EUCS2 | EUCS3 | MOC2 | MOC3 | REA2 | REA3 | RST2 | RST3 |
|---|---|---|---|---|---|---|---|---|---|
| EUCS1 | **0.87** | | | | | | | | |
| EUCS2 | 0.04 | **0.80** | | | | | | | |
| EUCS3 | 0.07 | 0.11 | **0.82** | | | | | | |
| MOC2 | 0.07 | 0.52*** | 0.12 | **0.79** | | | | | |
| MOC3 | -0.10 | 0.00 | 0.55*** | 0.05 | **0.79** | | | | |
| REA2 | -0.05 | 0.47* | 0.01 | 0.62*** | 0.05 | **0.81** | | | |
| REA3 | -0.02 | 0.03 | 0.33 | 0.07 | 0.61*** | 0.07 | **0.79** | | |
| RST2 | 0.00 | -0.08 | 0.09 | -0.06 | 0.07 | -0.21 | 0.08 | **0.90** | |
| RST3 | 0.10 | 0.05 | 0.15 | 0.13 | 0.23* | 0.04 | 0.14 | 0.04 | **0.94** |

*Notes*: The diagonal elements (in bold) are square roots of AVE. *p<.05 **p<.01 ***p<.001

Table 5 in Appendix B presents the factor loadings and cross loadings for the combined data (Time 1, Time 2 and Time 3 combined model). These factor loadings and cross loadings indicate good convergent and discriminant validities with their respective, associated corresponding (and non-corresponding) latent constructs. All factor loadings are 0.70 or greater, indicating good indicator reliabilities with the exception of Explained2 (0.691), which is acceptable. All cross-loadings are significantly lower in magnitude than the corresponding factor loading, with some cross-loadings exceeding the recommended 0.50 (averaged at 0.55 with only one above .06 at 0.65).

Additionally, each item's factor loading on its respective construct is statistically significant ($p < 0.001$). The latent constructs' items' loadings and cross loadings presented in Appendix B, and their levels of statistical significance, serve to affirm the convergent validity of these indicators as representing distinct latent constructs in the research model.

## *Hypothesis Testing*

The results of the PLS model are presented in Figure 2. The research model presented as Figure 1 was tested in a path analytic framework using the segregated data for Time 1, Time 2 and Time 3. The data from Time 1 is represented in the EUCS1 construct (user satisfaction with the existing old system). The data from Time 2 and Time 3 are represented using the complete research model (Figure 1).

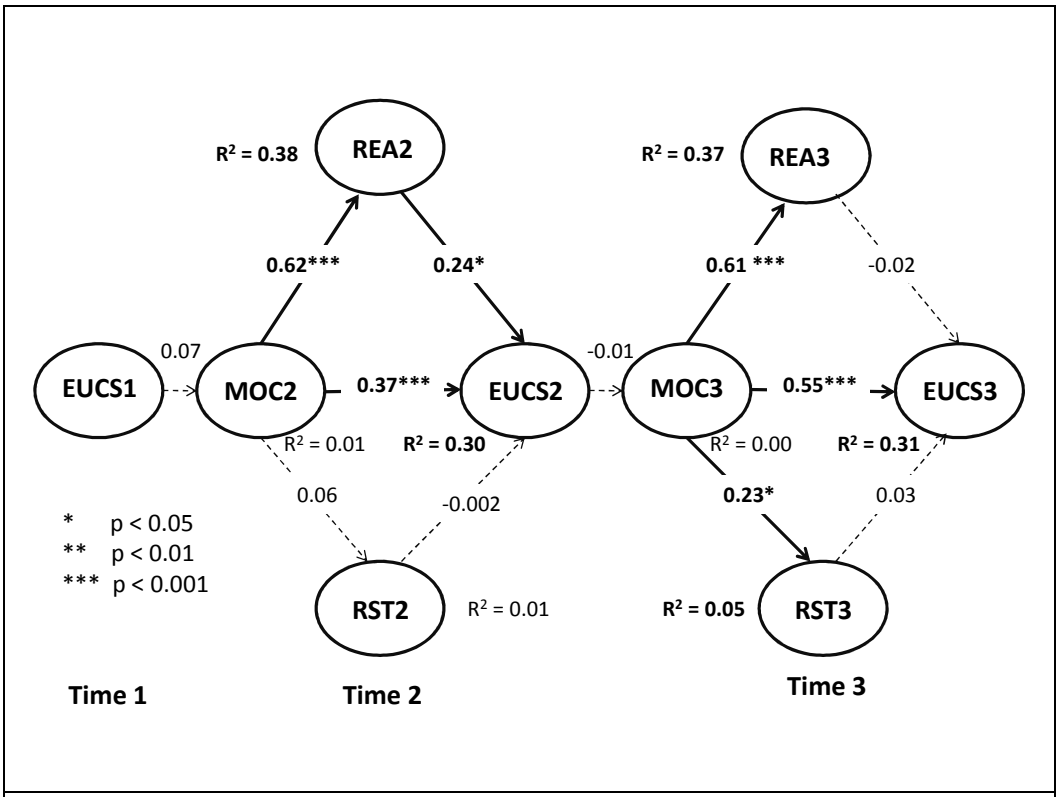


Figure 2. PLS Results of Full Model Testing

Path coefficients, significance levels, and the amount of variance explained ($R^2$) for the predicted endogenous latent constructs are indicated in Figure 2. Satisfaction at Time 1 (EUCS1) has insignificant impact on management of change (MOC2) of Time 2, failing to support H1. At Time 2 and Time 3, management of change does have a significant positive impact on readiness (MOC2→REA2: $\beta = 0.62$, $p < 0.001$, $R^2 = 38\%$; MOC3→REA3: $\beta = 0.61$, $p < 0.001$, $R^2 = 37\%$), which support H2. MOC2 has insignificant impact on resistance (RST2Time 2) in Time 2, and a small positive significant impact on resistance in Time 3 (MOC3→RST3Time 3: $\beta = 0.23$, $p < 0.05$, $R^2 = 5\%$), failing to support H3.

At Time 2, readiness has positive significant impact on user satisfaction (REA2→EUCS2: $\beta = 0.24$, $p < 0.05$), which supports H4 during the implementation, but at Time 3, the impact is insignificant failing to support H4 post-implementation. At both Time 2 and Time 3, resistance does not have a significant negative impact on user satisfaction, failing to support H5. At both Time 2 and Time 3, management of change does have a significant positive impact on user satisfaction (MOC2→EUCS2: $\beta = 0.37$, $p < 0.001$; MOC3→ECUS3: $\beta = 0.56$, $p < 0.001$). The path coefficients from MOC to EUCS are 0.37 and 0.55 for Time 2 and Time 3, respectively. Both are statistically significant. Thus provide support for H6. User satisfaction from Time 2 has no impact on MOC3.

In addition, the MOC→ECUS relationships at Time 2 and Time 3 were tested for mediation or moderation by either REA or RST with no significant results. T-tests did not show significant differences between early responders and late responders in each period, which suggests that 'no response' bias is unlikely to be a serious concern. Demographic data were collected but no significant differences were detected between groups based on position, area of employment, age, gender, or educational level.

# Discussion

This research hypothesized that lower satisfaction with the old system would result in a more favorable perception of management of change to the new system. However, the empirical results show that the satisfaction with old system has no impact on the perception of how well the change to the new system has been managed.

The user perception of management of change effectiveness exerts a stable and positive effect on readiness for change, as well as on the end-user computing satisfaction both during and after an implementation. When users believe that management has been fair, supported the change, communicated well, and provided good training for the new system, they are more prepared for and satisfied with the implementation. Readiness for change positively affects end-user computing satisfaction during the implementation but not post implementation. After the implementation, readiness, or looking forward to change, is no longer meaningful as the change has already ended. How well management of change has been conducted through the change process is, however, still relevant because the strategies in change management – such as communication, training, technology resource availability -- are still contributing to the ease of use of the new system, etc. If dissonance had existed from unrealized expectations, then high readiness in an earlier period and low satisfaction in a later period would have occurred. This study did not see such occurrences.

Resistance does not negatively affect end-user computing satisfaction both during and post implementation contrary to expectations. It has been suggested that possibly, if the EUCS of the new system is high, then the user who had a high resistance to change is more than satisfied with the new system. No significant negative relationship exists during the implementation between the perception of management of change effectiveness and resistance to change. Surprisingly, users' perceptions of management of change effectiveness have a significant positive relationship to resistance post implementation. A possible explanation is that users of the new system after its implementation have stabilized their familiarity with the new system. Hence, their inherent resistance to change is possibly for another system rather than the already-implemented system. It is also possible that change management activities like involvement, etc. enables a user to take stances for or against certain aspects of the new system, and hence, management of change may lead to both resistance and readiness for change. This longitudinal study indicates that measuring resistance post implementation needs to be specifically clarified in the survey that it measures resistance attitude towards which system or such an instrument should simply be deleted.

## *Implications for Research*

Taking longitudinal measurements offers valuable inputs and the opportunity for analysis to adapt management of change strategies. The combined research model seeks to become what Davis et al. (1989) recommended -- a simple but powerful model of the determinants of user acceptance, with practical value for evaluating systems and guiding managerial interventions.

This study contributes to literature on how to plan for IS change, how to measure and evaluate progress, and how to acquire valuable interim inputs to adapt the change process for better IS success.

Our findings in this study have important theoretical implications for IS research. The users' perception of management of change effectiveness exerts a strong effect on readiness for change and on the end-user satisfaction. Readiness is a significant contributing factor to satisfaction during an implementation, but not after. Our findings suggest that in the context of mandatory IS use, classical acceptance theories (Bhattacherjee and Hikmet 2007; Cooper and Zmud 1990; Hirscheim and Newman 1988; Hultman 1995; Kwahk and Kim 2008) should be applied with caution.

Resistance and readiness are not simply the reverse of each other. The users' perception of management of change effectiveness has a strong positive effect on readiness both during the implementation and post-implementation. However, the users' perception of management of change has no consistent impacts on resistance, especially during the implementation. Readiness has a significant positive effect on end-user satisfaction during the implementation, but resistance has no effect on satisfaction both during and post implementation. Therefore, readiness rather than resistance has a more prominent role in predicting IS success.

## *Implications for Practice*

This study makes a significant contribution to IS practice. It illustrates that in mandatory settings, organizations that decide to implement enterprise-wide systems should not ignore the importance of the management of change strategies that communicate about the change, deal fairly with users, demonstrate management support, supply technical availability, and conduct training to increase perceived ease of use to positively affect both readiness for change and user satisfaction.

Contrary to what has been suggested in the literature, management should focus on measuring and enhancing users' readiness for change instead of emphasizing on measuring and reducing users' resistance to change.

The suggested survey instrument is a tool that measures readiness for change, resistance to change, user satisfaction, and perception of how well change has been managed. It allows issues for resolution during a change management process to surface and assists management in the change process to assure a successful IS implementation.

## *Limitations and Future Research*

The study may be limited by results of self-reports, which may be unduly biased by a single cross-sectional test method. This limitation is balanced by multiple samples performed at three points in time. The data were collected in the manner developed and detailed due to eminent system implementation.

Although this study was conducted in an academic setting at a university, it is generalizable to any other information system implementation. The new information system in this study is mandatory and caution should be exercised when generalizing results to users of voluntary systems.

Although the impacts of different factors in management of change on satisfaction, resistance, or acceptance have not been studied here, the use of SmartPLS does allow the examination of different change management factors' downstream impacts simultaneously. A further research will be conducted to evaluate the interactions or the relative importance of change management factors to the downstream constructs.

This research directly measures end-user computing satisfaction at a point of time during and after an implementation. It did not measure the dissonance between what users may have expected and what they experienced. A user may have higher than usual expectations of the new system, and hence, low satisfaction, although the system is implemented and in operation as designed and delivers the promised benefits. Further research can be conducted to study dissonance of users.

While some questions in the readiness instrument specifically refer to the CAMS system, the four items in the resistance instrument touch more on the inherent attitude to any change rather than to CAMS. Further study should include a more extensive instrument for resistance with items modified to specifically refer to the current IS implementation.

## Conclusion

The objective of this study is to understand the impact of management of change perceived effectiveness on resistance to change, readiness for change, and end-user computing satisfaction in an IS implementation. The results indicate that end-user satisfaction as a surrogate for IS success is strongly influenced by management of change. The study draws attention to the role management of change has in building user readiness and end-user satisfaction. Readiness for change has a significant positive effect on end-user computing satisfaction during but not after an implementation; however, resistance to change has no significant effect on end-user satisfaction during or post-implementation. The study contributes to the IS literature by providing a new perspective that complements the extant IS adoption as well as change management research. Management strategies that raise users' opinion of fairness, management support, technical resource availability, communication, and training will increase the user readiness for change and the computing satisfaction with the content, format, timeliness, accuracy, and ease of use of the new IS implementation.

Problems with user acceptance of new technologies can be overcome by establishing mechanisms for user feedback (Heichler, 1995). Change management is an adaptive process. The survey instrument in Appendix A and its enhanced version can be used to gather inputs for management to identify issues faced before or during a change process and to adapt management of change strategies for the purpose of increasing users' readiness for change and ultimately enhancing end-user computing satisfaction.

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# Appendix A

**Instrument Detail**

SECTION I. BACKGROUND INFORMATION (**DEMOGRAPHICS**)

1. How would you decscribe your position with the university?
☐Administrative Team ☐Other Administrative & Professional Staff ☐ Other Staff
☐Freshman ☐Sophomore ☐Junior ☐Senior ☐Graduate Student
☐Full Professor Associate Professor ☐Asst Professor ☐Adjunct Professor
☐Other

2. Area of employment☐
Admissions ☐Advancement Business Office ☐Auxiliary Support
☐Financial Aid ☐Registration ☐Administration ☐Instruction
☐Student ☐Other

3. Age group
☐ Under 20 ☐20-29 ☐30-39 ☐40-49 ☐ 50 or over

4. Gender
☐ Male ☐ Female

5. Highest educational level
☐ High school graduate ☐ 2 year degree
☐ 4 year degree ☐ Masters degree ☐☐Doctorate degree

**SECTION II. SATISFACTION WITH THE CURRENT INFORMATION SYSTEM (EUCS)**

Regarding the current information systems.(Referred to fx Scholar, ACT, Response Plus, etc. at *Time 1*; CAMS at *Time 2 and Time 3*)

Choose the number that most closely indicates the time that the statement is true:
1 =Almost never, 2= Not usually, 3= Sometimes, 4 = Mostly, 5 =Almost always

6. Does the system provide the precise information you need?
7. Does the information content meet your needs?
8. Does the system provide reports that seem almost exactly what you need?
9. Does the system provide sufficient information?
10. Is the system accurate?
11. Are you satisfied with the accuracy of the system?
12. Do you think output is provided in a useful format?
13. Is the output information clear?
14. Is the system user friendly?
15. Is the system easy to use?
16. Do you get the information you need in time?
17. Does the system provide up-to-date information?

**SECTION III. ATTITUDE TOWARD CHANGE**

The following questions ask about your attitude toward change in general and the change from the current information systems to CAMS Enterprise™ (Comprehensive Academic Management System). Indicate the extent you agree or disagree with the following statements:

1= Strongly disagree, 2 = Disagree, 3 =Neither agree nor disagree, 4 =Agree, 5= Strongly Agree, N/A = Not applicable

18. I don't want to change how I generate reports/retrieve information. (**RST**)
19. I don't want to change how I enter data. (**RST**)
20. I don't want to change the way I currently work. (**RST**)
21. I don't want to change how I interact with others. (**RST**)
22. I find most changes with information systems pleasing. (Remaining items are **REA**)
23. I find most changes with information technology benefits the organization.
24. I am inclined to try new ideas in information systems.
25. Changes with information systems tend to stimulate me.
26. Changes with Information systems often help my performance.
27. I usually support new ideas in information systems.
28. Other people think I support the change to CAMS.
29. I often suggest new approaches in information systems.
30. I like the CAMS system.
31. I usually benefit from change in information systems.
32. I will benefit from the CAMS system.
33. Most coworkers will benefit from CAMS..
34. I intend to support the change to CAMS.

**SECTION IV. CHANGE TO CAMS (MOC)**

The following statements ask you to assess how the university is preparing you for the move to CAMS. Indicate the extent you agree or disagree with the following statements:

1=Strongly Disagree, 2=Disagree, 3= Neither agree nor disagree, 4 =Agree, 5= Strongly Agree, N/A = Not applicable

35. Sufficient notice was given to those affected by the change.
36. Those affected by the change had ample opportunities for input.
37. Sufficient resources were available to support the change.
38. I received adequate training in using CAMS.
39. All levels of management are committed to the change.
40. The organization kept everyone fully informed during the change.
41. People affected negatively by the change were treated fairly.
42. Assistance is readily available to help me with using CAMS.
43. An adequate explanation was given for why the change was necessary.
44. There is a designated person to contact for help on using CAMS.
45. When I request help with CAMS someone gets back to me quickly.
46. Management dealt quickly and effectively with “surprises” during the change.

# Appendix B

**Table 5. Cross Loadings**

| Variable | EUCS1 | EUCS2 | EUCS3 | MOC2 | MOC3 | REA2 | REA3 | RST2 | RST 3 |
|---|---|---|---|---|---|---|---|---|---|
| EAccuracy | 0.92 | -0.01 | 0.07 | 0.03 | -0.10 | -0.07 | -0.03 | 0.01 | 0.08 |
| EAccurate | 0.90 | 0.00 | 0.09 | 0.05 | -0.08 | -0.10 | -0.04 | 0.06 | 0.08 |
| EClear | 0.87 | 0.02 | 0.04 | 0.05 | -0.16 | -0.05 | -0.09 | 0.02 | 0.06 |
| EContent | 0.90 | 0.04 | 0.08 | 0.05 | -0.07 | -0.06 | -0.01 | -0.04 | 0.13 |
| ECurrent | 0.89 | 0.08 | 0.09 | 0.04 | -0.12 | -0.03 | 0.01 | -0.05 | 0.08 |
| EEasy | 0.78 | 0.10 | 0.06 | 0.01 | -0.14 | -0.05 | -0.09 | -0.03 | 0.07 |
| EFormat | 0.85 | -0.03 | 0.04 | 0.02 | -0.12 | -0.06 | -0.01 | 0.02 | 0.06 |
| EFriendly | 0.75 | 0.04 | 0.05 | -0.04 | -0.17 | -0.11 | -0.06 | -0.06 | 0.09 |
| ENeeds | 0.88 | -0.05 | 0.06 | -0.02 | -0.11 | -0.08 | -0.06 | 0.04 | 0.10 |
| EPrecise | 0.90 | 0.01 | 0.05 | 0.04 | -0.05 | -0.04 | -0.03 | -0.03 | 0.10 |
| ESufficient | 0.90 | 0.01 | 0.02 | 0.06 | -0.07 | -0.06 | 0.00 | -0.01 | 0.10 |
| ETimely | 0.89 | 0.07 | 0.06 | 0.06 | -0.12 | -0.01 | -0.02 | 0.00 | 0.10 |
| EAccuracy2 | -0.03 | 0.79 | 0.04 | 0.41 | -0.07 | 0.37 | 0.01 | -0.03 | -0.02 |
| EAccurate2 | 0.01 | 0.76 | 0.12 | 0.29 | -0.06 | 0.33 | -0.02 | -0.04 | -0.06 |
| EClear2 | 0.01 | 0.86 | 0.00 | 0.41 | -0.02 | 0.43 | 0.01 | -0.08 | 0.01 |
| EContent2 | 0.04 | 0.83 | 0.12 | 0.40 | 0.02 | 0.35 | 0.02 | -0.06 | 0.04 |
| ECurrent2 | 0.00 | 0.76 | 0.04 | 0.39 | -0.05 | 0.41 | 0.03 | -0.18 | -0.01 |
| EEasy2 | 0.04 | 0.74 | 0.12 | 0.46 | 0.03 | 0.37 | 0.04 | -0.08 | 0.14 |
| EFormat2 | 0.00 | 0.84 | -0.06 | 0.42 | -0.10 | 0.38 | -0.06 | -0.03 | -0.10 |
| EFriendly2 | 0.06 | 0.77 | 0.16 | 0.42 | 0.05 | 0.29 | 0.03 | -0.02 | 0.15 |
| ENeeds2 | 0.01 | 0.80 | 0.19 | 0.44 | 0.09 | 0.35 | 0.07 | 0.00 | -0.04 |
| EPrecise2 | 0.06 | 0.78 | 0.12 | 0.41 | 0.02 | 0.41 | 0.03 | -0.03 | 0.05 |
| ESufficient2 | 0.10 | 0.87 | 0.08 | 0.42 | 0.00 | 0.36 | 0.08 | -0.04 | -0.05 |
| ETimely2 | 0.04 | 0.81 | 0.15 | 0.45 | 0.05 | 0.40 | 0.05 | -0.13 | 0.04 |
| EAccuracy3 | 0.02 | 0.11 | 0.88 | 0.11 | 0.49 | 0.01 | 0.24 | 0.08 | 0.10 |
| EAccurate3 | 0.00 | 0.05 | 0.86 | 0.04 | 0.49 | -0.03 | 0.28 | 0.04 | 0.09 |
| EClear3 | 0.16 | 0.10 | 0.86 | 0.10 | 0.48 | -0.05 | 0.32 | 0.06 | 0.08 |
| EContent3 | 0.04 | 0.10 | 0.80 | 0.10 | 0.41 | 0.00 | 0.21 | 0.08 | 0.15 |
| ECurrent3 | 0.01 | 0.13 | 0.83 | 0.12 | 0.49 | 0.06 | 0.34 | 0.07 | 0.09 |
| EEasy3 | 0.05 | 0.03 | 0.82 | 0.04 | 0.45 | 0.06 | 0.32 | 0.13 | 0.06 |
| EFormat3 | 0.11 | 0.04 | 0.79 | 0.16 | 0.42 | 0.00 | 0.20 | -0.03 | 0.23 |
| EFriendly3 | 0.02 | 0.02 | 0.79 | 0.07 | 0.51 | 0.03 | 0.31 | 0.08 | 0.05 |
| ENeeds3 | 0.11 | 0.14 | 0.80 | 0.12 | 0.35 | -0.01 | 0.17 | 0.03 | 0.10 |
| EPrecise3 | 0.11 | 0.14 | 0.80 | 0.12 | 0.35 | -0.01 | 0.17 | 0.03 | 0.10 |
| ESufficient3 | 0.03 | 0.11 | 0.86 | 0.10 | 0.48 | -0.03 | 0.30 | 0.17 | 0.19 |
| ETimely3 | 0.10 | 0.16 | 0.81 | 0.13 | 0.43 | 0.05 | 0.31 | 0.08 | 0.12 |
| MAffected2 | 0.03 | 0.35 | 0.03 | 0.84 | -0.04 | 0.46 | 0.02 | 0.05 | 0.17 |
| MAssistance2 | 0.17 | 0.44 | 0.23 | 0.79 | 0.08 | 0.46 | 0.05 | -0.06 | 0.08 |
| MDesignee2 | -0.03 | 0.48 | 0.09 | 0.73 | 0.05 | 0.50 | 0.14 | 0.04 | 0.00 |
| MExplained2 | -0.07 | 0.28 | 0.04 | 0.69 | 0.21 | 0.47 | 0.19 | -0.22 | 0.17 |
| MFair2 | 0.10 | 0.39 | 0.07 | 0.72 | -0.04 | 0.45 | -0.07 | 0.04 | 0.03 |
| MInformed2 | 0.07 | 0.43 | 0.13 | 0.87 | 0.08 | 0.55 | 0.09 | -0.07 | 0.12 |
| MMgmtSupport2 | 0.06 | 0.39 | 0.05 | 0.80 | 0.08 | 0.57 | 0.03 | -0.12 | 0.11 |
| MNotice2 | 0.04 | 0.41 | 0.08 | 0.85 | -0.05 | 0.56 | 0.06 | -0.03 | 0.12 |
| MReaction2 | 0.09 | 0.48 | 0.13 | 0.85 | 0.02 | 0.53 | 0.05 | -0.07 | 0.07 |

**Table 5. Cross Loadings (cont.)**

| Variable | EUCS1 | EUCS2 | EUCS3 | MOC2 | MOC3 | REA2 | REA3 | RST2 | RST 3 |
|---|---|---|---|---|---|---|---|---|---|
| MResources2 | 0.03 | 0.34 | 0.11 | 0.80 | 0.01 | 0.39 | -0.01 | 0.06 | 0.12 |
| MResponse2 | 0.09 | 0.44 | 0.11 | 0.76 | 0.02 | 0.43 | 0.05 | -0.12 | 0.03 |
| MTraining2 | 0.04 | 0.40 | 0.06 | 0.73 | 0.09 | 0.43 | 0.07 | -0.05 | 0.22 |
| MAffected3 | -0.11 | 0.02 | 0.45 | 0.04 | 0.80 | 0.00 | 0.48 | 0.07 | 0.13 |
| MAssistance3 | -0.02 | -0.10 | 0.41 | 0.03 | 0.77 | 0.00 | 0.44 | -0.01 | 0.26 |
| MDesignee3 | -0.04 | -0.12 | 0.38 | 0.01 | 0.77 | 0.01 | 0.39 | -0.02 | 0.33 |
| MExplained3 | -0.12 | 0.00 | 0.36 | 0.01 | 0.77 | 0.02 | 0.52 | 0.03 | 0.10 |
| MFair3 | -0.07 | -0.01 | 0.38 | 0.06 | 0.75 | 0.06 | 0.48 | -0.06 | 0.12 |
| MInformed3 | -0.17 | 0.04 | 0.43 | 0.04 | 0.81 | 0.04 | 0.48 | 0.02 | 0.16 |
| MMgmtSupport3 | -0.15 | 0.02 | 0.44 | 0.03 | 0.70 | 0.02 | 0.49 | 0.14 | 0.07 |
| MNotice3 | -0.15 | 0.02 | 0.44 | 0.03 | 0.70 | 0.02 | 0.49 | 0.14 | 0.07 |
| MReaction3 | 0.03 | -0.02 | 0.48 | 0.04 | 0.85 | 0.03 | 0.55 | 0.05 | 0.16 |
| MResources3 | -0.11 | 0.03 | 0.47 | 0.06 | 0.86 | 0.06 | 0.54 | 0.10 | 0.25 |
| MResponse3 | -0.01 | -0.05 | 0.42 | 0.10 | 0.77 | 0.09 | 0.39 | 0.03 | 0.31 |
| MTraining3 | -0.02 | 0.13 | 0.46 | 0.02 | 0.79 | 0.04 | 0.46 | 0.10 | 0.15 |
| BenefitCams2 | -0.03 | 0.35 | 0.01 | 0.59 | 0.02 | 0.84 | 0.01 | -0.25 | 0.07 |
| BenefitUsually2 | 0.02 | 0.42 | 0.10 | 0.47 | 0.04 | 0.82 | 0.12 | -0.22 | 0.13 |
| Help2 | -0.11 | 0.33 | 0.04 | 0.52 | 0.03 | 0.77 | 0.01 | -0.18 | 0.09 |
| Opinion2 | -0.04 | 0.34 | -0.11 | 0.45 | 0.00 | 0.81 | 0.03 | -0.14 | 0.02 |
| PeerBenefit2 | -0.07 | 0.48 | 0.10 | 0.55 | 0.13 | 0.84 | 0.18 | -0.18 | 0.01 |
| Stimulate2 | -0.04 | 0.38 | -0.01 | 0.40 | 0.02 | 0.81 | -0.01 | -0.13 | -0.07 |
| Suggestions2 | 0.00 | 0.39 | -0.02 | 0.53 | 0.03 | 0.80 | 0.03 | -0.11 | 0.10 |
| SupportCams2 | -0.07 | 0.36 | 0.01 | 0.57 | 0.04 | 0.84 | 0.05 | -0.23 | 0.03 |
| Supportive2 | 0.03 | 0.39 | 0.01 | 0.47 | 0.01 | 0.81 | 0.02 | -0.18 | -0.08 |
| TryNew2 | -0.05 | 0.31 | -0.04 | 0.40 | 0.03 | 0.74 | 0.04 | -0.09 | -0.02 |
| BenefitCams3 | 0.02 | -0.04 | 0.43 | 0.08 | 0.65 | 0.07 | 0.84 | 0.01 | 0.22 |
| BenefitUsually3 | 0.04 | 0.04 | 0.26 | 0.05 | 0.44 | 0.01 | 0.83 | 0.02 | 0.15 |
| Help3 | -0.09 | 0.00 | 0.24 | 0.06 | 0.55 | 0.07 | 0.79 | 0.03 | 0.20 |
| Opinion3 | -0.08 | 0.03 | 0.21 | 0.06 | 0.43 | 0.04 | 0.75 | 0.11 | 0.07 |
| PeerBenefit3 | 0.10 | 0.00 | 0.30 | 0.05 | 0.50 | 0.05 | 0.83 | 0.19 | 0.09 |
| Stimulate3 | -0.05 | 0.07 | 0.14 | 0.02 | 0.39 | 0.02 | 0.77 | 0.12 | -0.02 |
| Suggestions3 | -0.09 | 0.06 | 0.15 | 0.01 | 0.38 | 0.01 | 0.72 | 0.07 | 0.12 |
| SupportCams3 | 0.01 | 0.02 | 0.37 | 0.10 | 0.59 | 0.08 | 0.85 | 0.07 | 0.09 |
| Supportive3 | -0.06 | 0.09 | 0.14 | 0.08 | 0.37 | 0.09 | 0.78 | 0.02 | -0.02 |
| TryNew3 | -0.03 | 0.07 | 0.14 | 0.04 | 0.32 | 0.04 | 0.74 | -0.01 | 0.05 |
| RData2 | -0.01 | -0.05 | 0.12 | -0.05 | 0.09 | -0.21 | 0.05 | 0.89 | 0.06 |
| RInteraction2 | 0.03 | -0.11 | 0.02 | -0.06 | 0.02 | -0.16 | 0.08 | 0.89 | -0.02 |
| RMethods2 | -0.02 | -0.05 | 0.15 | -0.01 | 0.07 | -0.24 | 0.07 | 0.90 | 0.10 |
| RReports2 | -0.04 | -0.01 | 0.11 | -0.09 | 0.08 | -0.20 | 0.08 | 0.89 | 0.06 |
| RData3 | 0.06 | 0.01 | 0.13 | 0.12 | 0.20 | 0.05 | 0.12 | 0.05 | 0.95 |
| RInteraction3 | 0.12 | 0.02 | 0.17 | 0.09 | 0.25 | 0.02 | 0.14 | 0.02 | 0.93 |
| RMethods3 | 0.11 | 0.03 | 0.11 | 0.12 | 0.19 | 0.02 | 0.12 | 0.04 | 0.95 |
| RReports3 | 0.07 | 0.01 | 0.15 | 0.15 | 0.20 | 0.06 | 0.12 | 0.04 | 0.92 |