

Creating Support for Organizational Change: *An Outcome-Oriented Analysis of Change Readiness*

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Abstract

A major area of innovation within the architecture, engineering, and construction (AEC) industry involves the re-engineering of project delivery processes, yet successful implementation of such processes requires a significant organizational change effort. The AEC industry is often regarded as a laggard in the uptake of innovation, and personnel resistance to change is among the most commonly cited barriers to change adoption. The objective of this study was to understand the extent to which project level personnel change readiness is affected by a variety of antecedents within 16 AEC owner organizations, each of which independently implemented a planned strategic change in their project delivery processes. An outcome-oriented perspective of change readiness was incorporated to empirically document behavioral response to change at the individual level (n = 96) among owner project managers and contracting officers. Change readiness outcomes were measured via an action research method in relation to contextual, personnel, content, and process antecedents present prior to change implementation on each AEC project. Results indicated that change management process factors of increased change message delivery and extensive change agent involvement had the greatest effect on outcomes of high change readiness. Individual experience and project scope considerations also had a relationship with change readiness, although to a far lesser extent. Contributions of this study include an empirical, multi-organization, real-time data set of change implementation within the AEC industry, identification of significant antecedent effects on personnel change readiness outcomes, and associated recommendations for change practitioners. Future research is recommended to investigate additional personnel-oriented characteristics of project teams and their corresponding relationship to change readiness.

Research Details

INTRODUCTION

In recent years, owner organizations in the architecture, engineering, and construction (AEC) industry have increasingly sought more effective methods to procure and manage their projects (Miller et al. 2000; Sullivan 2011). Owner-driven innovation within the AEC industry has primarily emphasized the re-engineering of project delivery processes, such as the owner's approach to proposal criteria and evaluations, how design and construction operations are planned and organized, and how owners manage their relationships with consultants and contractors throughout the lifetime of service delivery (Bygballe and Ingemansson 2014; Migliaccio et al. 2008).

Implementation of a re-engineered project delivery process requires owner organizations to initiate a planned organizational change effort aimed at steadily codifying the new processes within their everyday operations. Enacting a planned organizational change is both a complex and resource-intensive undertaking (Armenakis and Harris 2009), particularly in the AEC industry, which, at times, is accused of lagging behind other industries in the uptake of innovation (Bygballe and Ingemansson 2014; Henderson and Ruikar 2010; Marsh and Flanagan 2002). The manner in which an organization's personnel react to a planned change can have a considerable effect on implementation success; in fact, personnel support is identified to be critical for success in strategic change initiatives (Jansen et al. 2009), whereas personnel resistance is perhaps the most significant barrier (Foote 2001; Peansupap and Walker 2005).

The concept of change readiness is directly linked to employee behaviors to accept or oppose organizational change, which intertwines behavioral outcomes of change readiness with the actual success of organizational change efforts (Armenakis et al. 1993, p. 681). Change readiness is commonly defined in the literature as "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 a critical concept for change practitioners, evidenced by Jones et al.'s (2005) finding that heightened readiness levels were predictive of change implementation success, where success was measured as personnel satisfaction with and usage of new systems. With these stakes in mind, researchers have long argued that organizations should consider antecedent conditions present before launching change initiatives and whether antecedents can foster greater change readiness, which in turn may minimize opposition and encourage personnel acceptance of the change (Judson 1991).

The objective of this study was to understand the extent to which project level personnel change readiness is affected by a variety of antecedents within 16 AEC owner organizations, each of which independently implemented a planned strategic change in their project delivery processes. An outcome-oriented perspective of change readiness was incorporated to empirically document behavioral response to change at the individual level ($n = 96$) among owner project managers and contracting officers. Change readiness outcomes were measured via an action research method in relation to contextual, personnel, content, and process antecedents present prior to the start of change implementation on each AEC project. Comprehensive statistical analysis, including correlation analysis, hierarchical multiple regression, and relative weight analysis was conducted to identify the extent to which antecedents significantly affected personnel change readiness outcomes. Contributions of this study include an empirical, multi-organization, real-time data set of change implementation within the AEC industry, identification of significant antecedent effects on personnel change readiness outcomes, and associated recommendations for change practitioners.

CHANGE READINESS: AN OUTCOME-ORIENTED PERSPECTIVE

In their recent review of the change readiness literature, Rafferty et al. (2013, pp. 112–113) emphasized the need for future research to focus on outcome measures of change readiness and designated change-supportive behaviors as "one set of key outcomes." Weiner (2009, p. 71) identified outcomes such as pro-change behavior and commitment to change as perhaps the "least theorized and least studied aspect" of readiness for change. Past studies have shown that organizational members exhibit high readiness by

demonstrating enthusiasm and change-supportive behaviors during implementation, whereas low readiness is manifested by minimal effort at best and outright resistance at worst (Jones et al. 2005; Lines 2004). Therefore, a key indicator of whether employees did indeed have high readiness, or a lack thereof, is by measuring change readiness outcomes during implementation.

Beyond their implications for overall implementation success, outcome measures of change readiness contain distinct methodological advantages. At the individual level of analysis, which was adopted in this study, Rafferty et al. (2013) argue that measures of employee intentions to change are not appropriate to include as a component of readiness; rather, they recommend direct observations of employee positive (or negative) emotional responses to change as a more evaluative judgment of change readiness. Social learning theory proposes that high change readiness is reflected during implementation by organizational members who participate in change initiation actions, exert greater effort when faced with barriers, and demonstrate a capacity for supportive and championing actions (Bandura 1986). Furthermore, research studies designed to measure change readiness levels in real time, during the change event itself, have benefits over retroactive studies because people have been found more likely to overestimate positive and negative emotions when reflecting on past events (Fisher 2002).

Behavioral Continuums of Change Readiness

Within the organizational change literature, Coetsee (1999, p. 204) noted that authors tend to focus either on change-accepting reactions such as supportive actions, willing participation, and commitment or on change-rejecting behaviors such as resistance, opposition, and avoidance. Yet these two areas are seldom linked. This is still the case in more recent literature, where many authors have emphasized change-supportive behavior yet neglected change rejection (Herscovitch and Meyer 2002; Fedor et al. 2006; Jaros 2010; Kim et al. 2011), while others have focused on levels of employee resistance without including change-acceptance indicators (Bareil et al. 2007; Giangreco and Peccei 2005; Hultman 2006; Piderit 2000; Smollan 2011). Such studies tend to define the low end of their scales, with either a lack of resistance or a lack of support, and fall short of fully linking the two phenomena.

Coetsee (1999) purported that change acceptance and rejection actually comprise two opposite poles on a single continuum of change reactions, linked together by a neutral “transition phase” consisting merely of compliant behavior. Coetsee’s definition of change acceptance was commitment focused and divided into supportive actions such as cooperation, participation, and championing. Change rejection was placed on a scale ranging from passive, active, and aggressive resistance. Coetsee’s assertion of a single continuum was supported by an earlier study which found that when change readiness is high, employees will more skillfully, persistently, and supportively act to implement the change, whereas when readiness is low, employees will resist, put forth minimal effort, and at best engage in compliant action (Klein and Sorra 1996).

The concept of behavioral continuums of change readiness is also related to research in the area of diffusion of innovation, where an individual’s “innovativeness” is defined as their willingness to engage in workplace change initiatives (Braak 2001). The wellknown diffusion of the innovation bell curve, developed by Rodgers (2003), theorizes that human reactions to innovation follow a normal distribution, including early adopters who will lead the change as enthusiastic champions, the early majority who

support the change once it has been endorsed by leaders, the late majority who react to change in a skeptical and uncomfortable manner, and the laggards who are openly resistive in their rejection of innovation.

Change-Accepting Behaviors

Change acceptance includes change-supportive behaviors and commitment to change, which are typically defined in a strictly positive sense that does not consider change rejection (Jaros 2010, p. 87). Kim et al. (2011, p. 1665) considered change-supportive behaviors, which they defined as actions employees engage in “to actively participate in, facilitate, and contribute to a planned change initiated by the organization,” to be key indicators of change readiness. Herscovitch and Meyer (2002) conducted two studies on employee commitment to organizational change, which they defined as a mentality that “binds an individual to a course of action deemed necessary for the successful implementation of a change initiative.” Their first study measured commitment in terms of change-supportive behaviors such as employee compliance, cooperation, and championing actions, yet stopped short of including change. In their second study, Herscovitz and Meyer did broaden their focus to account for active and passive resistance (Herscovitch and Meyer 2002, p. 478); however, their inclusion of a separate set of multi-item scales focused exclusively on compliance, cooperation, and championing behavior, which supports their definition of commitment as a predominantly change-supportive measure.

Change-Rejecting Behaviors

Change rejection is most commonly cited in terms of personnel resistance, which includes actions intended to hinder a planned organizational change. Resistance to change is perhaps the most significant barrier to the successful implementation of new processes (Foote 2001; Maurer 1996; Peansupap and Walker 2005; Prochaska et al. 2001). Coetsee (1999) noted that resistance is “usually seen as a negative force.” Resistance to change is most commonly measured in the form of directly observable behaviors (Mumby 2005). For example, Giangreeco and Peccei (2005) defined resistance to change as a form of dissent to a change process, including a range of indifferent, passive, and active behaviors. In another study, Hultman (2006) divided resistance into two distinct forms, which he classified as active and passive displayed behaviors.

Lines et al. (2015) investigated personnel resistance within owner organizations who implemented a planned change in the project delivery tactics used to procure, contract, and manage their AEC projects (n = 104). Their study was limited to the resistance domain, where resistance to change was viewed as a dichotomous measure to document the frequency with which owner project team members resisted change implementation. A key result of their analysis was to identify the presence and involvement of formal change agents as a major factor in reducing the frequency of personnel resistive behaviors; however, their study did not account for the intensity of the personnel reactions encountered nor did it consider change-supportive behaviors. The present study addresses these limitations through further analysis of a majority subset of Lines et al.’s (2015) data sample, shifting the focus from resistance frequency to a scaled intensity measure of change readiness. Change readiness is defined in the present study as an outcome-oriented measure comprised of a continuous spectrum of change-rejecting, change-

neutral, and change-accepting behaviors, thereby capturing a broader behavioral range and accounting for the intensity (rather than frequency) of personnel reactions to change Implementation

ANTECEDENTS OF CHANGE-READINESS

Much research has been devoted to understanding how change implementation processes and conditions can affect change readiness. Successful organizational change efforts have been noted to emphasize the creation of high change readiness by fostering employee support, enthusiasm, and positive thinking about the change rather than merely focusing on overcoming resistance (Piderit 2000). Although little research has been specific to the AEC industry, proposed methods for creating change readiness include four antecedent categories (Holt et al. 2007): context, the circumstances under which the change is occurring; personnel, the characteristics of the participating organizational members; content, the content of what is being changed, how much, and how quickly; and process, how the change is being communicated and implemented. The following sections examine the existing literature around these antecedent categories and their relationship to the change readiness of personnel specifically within the AEC industry.

Context Factors of Change Readiness

The literature acknowledges the project-based nature of the AEC industry as both a hindrance and driver of change implementation. The overall complexity and product diversity of the design and construction process is noted as a complicating factor for the industry's ability to accept and implement change (Bygballe and Jahre 2009; Slaughter 2000; Winch 1999). The entire industry is generally driven by individual projects, each with its own unique constraints around budget, schedule, and scope (Barrett and Sexton 2006; Tatum 1989). Implementing change can be difficult while the organization must also manage project-specific needs, particularly when the owner's business objectives can vary widely from one project to the next (Pheng and Teo 2004). Understanding how project-specific factors affect the project team's ability to accept and implement a planned change is critical, especially considering the large portfolio of projects owner organizations typically must choose from when nominating individual projects as candidates for enacting the new project delivery processes.

Personnel Factors of Change Readiness

When project personnel are asked to implement new processes, organizational learning ultimately occurs on an individual level as each project team member becomes familiar with the new expectations, approaches, and actions that are required within their role and responsibilities (Huang and Shih 2011). Wilkinson (2005) went so far as to suggest an AEC industry "rule of thumb" that 80 percent of successful implementation of innovative systems depends on "tackling personnel and process issues," whereas only 20 percent is related to resolving the technical aspects of the change. Top managers in construction often state that innovative capacity stems from experience on past projects, implying that technical experience of individual project members may influence how they respond to change (Nam and Tatum 1997). Hadjimonolis (2000) found individual capability and managerial position to affect innovation in small, project-based firms, and other research has noted that resistance often arises from the lower hierarchical levels within the organization who are often most affected by the change (Henderson and Ruikar 2010).

Content Factors of Change Readiness

Appropriate expectations and motivation of the change content can be crucial to an organization's ability to accept change (Barrett and Sexton 2006). Organizations often desire a "quick fix" (Garratt 1999), yet organizational change research points to impatience and unrealistic expectations of rapid change introduction as a primary reason for failure (Armenakis et al. 1999). Researchers have stressed the importance of planning longer strategic horizons for change implementation to be achieved (Tatum 1989). Rodgers (2003) argued that the rate of implementation is an important behavioral aspect, and Smollan et al.'s (2010) study found that even when participants accepted the specific objectives of the change, they may still resist the speed of the change if they feel it is unrealistic for the content that is required.

Another aspect of an organization's change-related expectations is their perception of how different the content of the new processes are in comparison to their traditional modes of operation. In a survey of 411 members of U.S.-based owner organizations who were implementing new project delivery systems for the first time (design-build), nearly 70 percent of respondents cited a gap between owner expectations and actual change outcomes, which resulted from a lack of understanding of the operational differences inherent within the new processes (Jergeas and Fahmy 2006). Personnel need an opportunity to "disengage" from the organization's current operations and become accustomed to the new process content (Denhardt et al. 2009). If organizational members do not expect the change to introduce a large shift in the content of their work requirements, they may react with shock and resistance when reality proves otherwise.

Process Factors of Change Readiness

Internal champions responsible for leading the change initiative play an important role in implementation (Wolpert 2010). In their study of a construction company's implementation of a new project management technology, Wong and Zhang (2013) identified top management support and the presence of an internal champion as key factors for success. A study of 10 successful implementations of innovation within the U.S. construction industry stated as an "unwritten rule" of success that top managers should be personally involved with implementation efforts (Nam and Tatum 1997). Another aspect of the organization's change management approach is the extent to which the change message is communicated to personnel. Change-related training is necessary to minimize employee uncertainty and the fear of not knowing how to perform their job function in a new way, which can ultimately result in reluctance or even open resistance (Wolpert 2010). Henderson and Ruikar (2010) observed that in order to increase change readiness, training and education should precede any change being introduced.

METHODOLOGY

This study was intended as an exploratory, theory-building investigation of the planned implementation of strategic change within the architecture, engineering, and construction industry. The research objective was to document an outcome-oriented measure of change readiness among personnel in AEC project teams and investigate the relationship between various antecedent conditions and individual change readiness.

Data Sample and Research Context

The data sample consisted of 16 AEC owner organizations, including 14 public owners (state and municipal governments, institutions of higher education, public school systems) and 2 private organizations (education, defense contracting). Each organization was separately engaged in the implementation of nearly identical organizational change objectives. Such consistency in organizational change objectives across a multi-organization data set is a unique contribution to the organizational development literature, where organizational changes come in a variety of forms (mergers, acquisitions, technology integration, business project reengineering, etc.), making comparison of cross-organization attributes difficult.

The organizational change objectives of the participating organizations consisted of the adoption of three new project delivery processes. First, a best value procurement process was implemented to select AEC firms, which introduced entirely new evaluation criteria within the owner organizations (in many cases differing significantly from the organization's existing procurement practices based upon low-bid or other traditional proposal criteria). The second new project delivery process being implemented was the completion of explicit planning deliverables by the project teams from the owner organization and the selected AEC firm prior to contract award. The output of this process included written documents detailing a project milestone schedule, mitigation approaches for specific project risks, and coordination of resources to be provided by the owner organization during project execution, all of which were included among the project contract documents. The third new process was a project management system for tracking risk management performance. This system was completed on a weekly basis for the project's duration to track all effects on project cost, schedule, quality, and owner satisfaction. These three processes being implemented in sequence were considered to be a set of new project delivery approaches when compared to each AEC owner organization's traditional forms of project delivery.

Action Research Method

Data collection followed an action research approach, where the researchers participated directly in the projects in a collaborative role with the owner organizations' project teams. This methodology was consistent with action research approaches conducted in other organizational change research studies within the AEC industry; for example, Rezgui (2007) investigated virtual collaboration in construction projects, Sunding and Odenrick (2010) facilitated enhanced problem-solving capacity of construction project teams, Abrahamse and Lotriet (2012) studied the diffusion of mobile technology among project teams, and Love et al. (2012) determined optimal procurement approaches for public sector infrastructure projects.

Benefits of action research include the opportunity to observe changes as they occur in real time, which facilitates a more detailed and holistic perspective of the organizational change dynamics within each project team (Coughlan and Coughlan 2002; Gummesson 2000; Jorgensen et al. 2003). Several data collection methods were employed, including content analysis of project documentation (including requests for proposals, proposal evaluation score sheets, precontract planning documents, risk management plans, project schedules, action item lists, change orders, and client satisfaction surveys), regular researcher participation in project meetings, and maintenance of a research journal documenting direct observation of personnel actions during change implementation

Variables and Level of Measure

The dependent variable, personnel change readiness, was observed in each of the 48 project implementations of the new project delivery processes across the 16 participating owner organizations. An outcome-oriented view of change readiness was measured for two key personnel on each project, the owner's project manager and the owner's contracting officer (n = 96). This study was therefore conducted at the individual level of analysis, rather than the group or organization level, which are the three levels of analysis defined in Rafferty et al.'s review of change readiness (Rafferty et al. 2013).

Change readiness was measured as a continuum of overt and directly observable behaviors ranging between the poles of extreme change acceptance and extreme change rejection. This continuum, defined in Table 1, was developed based upon previous scales in the literature such as Coetsee (1999), Judson (1991), and the second study conducted by Herscovitch and Meyers (2002). The behavioral measures of change-resistive behaviors were based upon studies by Giangreeco and Peccei (2005) and Hultman (2006), and change-supportive behaviors included recommendations from the first study conducted by Herscovitch and Meyers (2002).

Table 1. Outcome-Oriented Continuum of Change Readiness

Scale	Change readiness level	Definition
1	Extremely low	Actively rejecting the change through opposing and resistive behavior, including actions to combat, stop, and undermine the change
2	Low	Passively rejecting the change through opposing and resistive behavior, including actions to avoid and minimize cooperation with the change
3	Neutral	Compliance with the change in neither a supportive nor an unsupportive manner, displaying indifference and apathy
4	High	Passively supporting the change through willingly cooperative behavior, including participative actions that are favorable, supportive, and accepting of the change
5	Extremely high	Actively supporting the change through championing behavior, including participative actions to promote, enhance, and lead the change

Independent variables focused on four categories of change readiness antecedents: context, personnel, content, and process antecedents (Holt et al. 2007). Nine individual factors, define in Table 2, were identified among the four antecedent categories. Individual factors were measured as ordinal scales (with the exception of project scope, a categorical factor that was therefore measured on a nominal scale), which maintained methodological consistency across the nine factors and enabled exploratory research investigation of the relationships between individual sub-factors and the dependent variable. Further, these factors and their scales were selected based upon their ease of measure and unobtrusiveness of documentation within a practice-oriented action research setting. Antecedent factors were measured before project operations commenced in order to document the existing conditions prior to the point of initiating change implementation, enabling researchers to document change readiness outcomes in real time during implementation.

Table 2. Change Readiness Antecedents

Antecedent category	Individual factors	Subfactors	Number in sample (n = 96)	Percentage of sample (%)	Subfactor definition
Context	Project scope	Construction	44	45.8	Scope for construction services
		A/E	12	12.5	Scope for architectural or engineering services
		FM service	40	41.7	Scope for facility- and business-related services
	Project size	<\$1 million	34	35.4	Less than \$1 million
		\$1 million–\$25 million	34	35.4	Greater than \$1 million and less than \$25 million
		\$25 million+	28	29.2	Greater than \$25 million
Project duration ^a	< 1 year	28	30.4	Less than 1 year	
	1–3years	38	41.3	Longer than 1 year and less than 3 years	
	3 years+	26	28.3	Longer than 3 years	
Personnel	Position level	Frontline	61	63.5	Project-level (contracting officer, project manager)
		Supervisor	25	26.0	Manager (director, associate director)
		Executive	10	10.4	High-level (vice president, associate vice president)
	Career stage	Early	18	18.8	First 10 years of career
		Mid	47	49.0	Between early and late career stage
		Late	31	32.3	Last 10 years of career
Content	Implementation speed	None (N/A)	24	25.0	No intent to institutionalize the change (single project)
		Accelerated	36	37.5	Approx. 1 year effort and 1–5 project implementations
		Longitudinal	36	37.5	Multiyear effort, 5+ projects, continuing education
	Amount of organizational shift	Minimal	14	14.6	Perception of minor shift from traditional practices
		Moderate	30	31.3	Gaining new project tools and processes
		Large	52	54.2	Revolutionary approach to project delivery
Process	Change message delivery	None	37	38.5	No formal training prior to change implementation
		Limited	21	21.9	Project-specific training (2 h lecture-based)
		Immersive	11	11.5	Project and org. level (1 day, strategic participation)
	Change agent involvement	Experience	27	28.1	Direct previous experience implementing the change
		None	40	41.7	No formal change agents within the organization
		Irregular	14	14.6	Participation less frequent than once per month
Regular	12	12.5	Participation more frequent than once per month		
Direct role	30	31.3	Change agent will perform a lead project role		

^aProject duration data was unavailable for 4 entries, leaving a total of 92 data points available for this individual factor.

Data Analysis

A three-step analysis approach was used in order to investigate the extent to which change readiness is influenced by each of the nine change management factors measured. First, the bivariate relationships between change readiness and each predictor were investigated to identify significant bivariate associations. Spearman's rho was chosen due to the fact that the independent variables were ordinal data measures (McClure 2005). Analysis of each predictor's effect on change readiness followed Field's

recommendation (2009, p. 73) for interpreting correlation coefficients, where coefficients above 0.5 indicate a large effect, above 0.3 a medium effect, and above 0.1 a small effect.

Second, variable selection testing was performed with all statistically significant bivariate relationships in order to generate a best-fit multiple regression model. Three hierarchical regressions— stepwise, forward, and backward—were performed in order to determine consistency in the selected best-fit models. The stepwise and forward methods each began with an empty model and added significant predictors until no additional variables met the significance criteria for entry. The main difference between the stepwise and forward methods is that the stepwise method considers variables for entry based upon model significance, whereas the forward method adds variables based upon their partial correlations. The third variable selection method, backward hierarchical multiple regression, began with a full model (in this case, including all significantly correlated predictors) and considered the variable with the smallest partial correlation for removal ($p < 0.05$) until no more variables met the criteria to be removed.

Third, relative weight analysis (RWA) was utilized to understand the relative importance of each predictor included within the best-fit model. RWA is a method for measuring each predictor's proportionate contribution toward the total predicted variance of a regression model (Johnson and LeBreton 2004). The difference between RWA and more traditional methods used to compare the variance among correlated predictors is important to note. Researchers often report standardized regression coefficients (β values) to analyze the importance between a predictor and the outcome variable; however, standardized regression coefficients produce known flaws in variable importance, particularly when predictors are correlated with one another (Johnson and LeBreton 2004; Tonidandel and LeBreton 2014). RWA permits a "more accurate partitioning of variance among correlated predictors" and eliminates problems associated with collinearity, which makes RWA an effective tool for better understanding how each variable contributed towards the variance explained in the dependent variable (Tonidandel and LeBreton 2014).

Raw relative weights are calculated by creating a new set of predictors via an orthogonal transformation approach (such that the new, orthogonal values are maximally related to the original set of predictors), which are plotted against the dependent variable. This produces a series of standardized regression coefficients that are then rescaled back to the original variables to produce an estimated raw relative weight for each predictor (Tonidandel et al. 2009). The authors utilized the RWASWeb tool developed by Tonidandel and LeBreton (2014) to perform these calculations with significance tests based on bootstrapping with 10,000 replications. Rescaled relative weights were obtained by dividing each raw relative weight by the model variance to provide an estimate of each predictor's relative importance as a percentage of the total variance explained by the model. For full mathematical details on how relative weights were calculated, please refer to Tonidandel et al. (2009).

RESULTS

Bivariate Correlation Analysis

Correlation results and descriptive statistics are provided in Table 3. The correlation matrix revealed six significant correlations. The largest effect existed between change agent involvement and change readiness (0.604), which identified that direct involvement of change leaders served to increase personnel change readiness during implementation. Another large effect existed for change message delivery (0.558), suggesting that greater personnel exposure to change-related training prior to implementation increases their readiness level. A medium effect existed for the personnel position level (0.310), indicating that more senior personnel, such as supervisors and directors, exhibited greater change readiness than frontline personnel. Small effects were found for project scope (−0.297), the organization's expected implementation speed (0.250), and project size (−0.227). The negative direction of the project scope correlation shows that construction projects were more likely to possess higher readiness for change than facilities service projects. Higher change readiness was observed when the content of the change was expected to follow a multiyear, longitudinal implementation period, rather than an accelerated implementation rate. Change readiness was inversely related to project size, with smaller projects (valued under \$1 million) encountering higher change readiness among project personnel than larger projects. No significant association with change readiness was found for project duration, personnel career stage, or the organization's expectation of the change magnitude.

Table 3. Spearman Correlation

Variable	Context antecedents			Personnel antecedents		Content antecedents		Process antecedents		Dependent variable
	Project scope	Project size	Project duration	Position level	Career stage	Implementation speed	Amount of organizational shift	Change message delivery	Change agent involvement	Change readiness level
Project scope	1.000	—	—	—	—	—	—	—	—	—
Project size	0.131	1.000	—	—	—	—	—	—	—	—
Project duration	0.392 ^a	0.597 ^a	1.000	—	—	—	—	—	—	—
Position level	−0.150	0.023	0.107	1.000	—	—	—	—	—	—
Career stage	−0.113	0.111	−0.002	0.511 ^a	1.000	—	—	—	—	—
Implementation speed	0.015	−0.138	−0.009	−0.142	−0.215 ^b	1.000	—	—	—	—
Organizational shift	0.126	0.159	0.207 ^b	0.122	−0.145	0.460 ^a	1.000	—	—	—
Message delivery	−0.070	−0.038	0.049	0.041	−0.024	0.369 ^a	0.262 ^a	1.000	—	—
Change agent	−0.284 ^a	−0.250 ^b	−0.111	0.146	−0.058	0.339 ^a	0.247 ^b	0.558 ^a	1.000	—
Change readiness	−0.297 ^a	−0.227 ^b	−0.177	0.310 ^a	0.167	0.250 ^b	0.192	0.561 ^a	0.604 ^a	1.000

^aCorrelation is significant at the 0.01 level.

^bCorrelation is significant at the 0.05 level.

Multiple Regression: Variable Selection Testing

In order to generate a best-fit model for change readiness, variable selection testing was conducted by performing hierarchical multiple regression with the six antecedent factors that had significant correlations. Consensus was achieved among the three variable selection tests, shown in Table 4, which provided greater validity of the results. The selected best-fit model included four of the six predictors: change agent involvement, change message delivery, personnel position level, and project scope. The two factors of project size and implementation speed were removed as insignificant predictors. The resulting

best-fit model was statistically significant at the 99 percent confidence level and explained approximately 50 percent of the variation in personnel change readiness ($R^2 = 0.501$, $F[22.834]$, $p < 0.001$).

Table 4. Variable Selection Testing via Hierarchical Multiple Regression

Model description		Model results					Change statistics		
Variable selection test	Model	<i>R</i>	<i>R</i> square	Adjusted <i>R</i> square	<i>F</i>	Significance	<i>R</i> square change	<i>F</i> change	Significance <i>F</i> change
Stepwise and forward	1	0.582 ^a	0.339	0.332	48.17	0.000 ^a	0.339	48.170	0.000
Stepwise and forward	2	0.648 ^b	0.420	0.407	33.61	0.000 ^b	0.081	12.929	0.001
Stepwise and forward	3	0.683 ^c	0.467	0.449	26.61	0.000 ^c	0.047	8.113	0.005
Stepwise and forward	4	0.708 ^d	0.501	0.479	22.83	0.000 ^d	0.034	6.265	0.014
Backward	1	0.718 ^e	0.515	0.482	15.75	0.000 ^e	0.515	15.752	0.000
Backward	2	0.717 ^f	0.514	0.487	19.05	0.000 ^f	-0.001	0.159	0.691
Backward	3	0.708 ^d	0.501	0.479	22.83	0.000 ^d	-0.013	2.452	0.121

^aPredictors: (constant), change agent involvement.

^bPredictors: (constant), change agent involvement, change message delivery.

^cPredictors: (constant), change agent involvement, change message delivery, personnel position.

^dPredictors: (constant), change agent involvement, change message delivery, personnel position, project scope (selected model).

^ePredictors: (constant), change agent involvement, change message delivery, personnel position, project scope, project size, implementation speed.

^fPredictors: (constant), change agent involvement, change message delivery, personnel position, project scope, project size.

Relative Weight Analysis

Results of relative weight analysis, conducted using RWAWeb (Tonidandel and LeBreton 2014), are shown in Table 5, where b = unstandardized regression coefficient; β = standardized regression coefficient; RW = raw relative weight (within rounding error, raw weights will sum to R^2); CI-L = lower bound of confidence interval used to test the statistical significance of raw relative weight, RW; CI-U = upper bound of confidence interval used to test the statistical significance of raw relative weight, RW; and RS-RW= relative weight rescaled as a percentage of predicted variance in the criterion variable attributed to each predictor (within rounding error, rescaled weights sum to 100%).

Table 5. Relative Weight Analysis

Predictor	<i>b</i>	β	RW	CI-L	CI-U	RS-RW (%)
Intercept	2.150	—	—	—	—	—
Change message delivery	0.316 ^a	0.360	0.1942 ^a	0.0972	0.3069	38.77
Change agent involvement	0.260 ^a	0.310	0.1854 ^a	0.0923	0.2970	37.00
Project scope	-0.226 ^a	-0.193	0.0658 ^a	0.0047	0.1602	13.14
Position level	0.325 ^a	0.202	0.0555 ^a	0.0023	0.1262	11.08

Note: Relative weight analysis was conducted using RWA-Web (Tonidandel and LeBreton 2014). Dependent variable = change readiness { $R^2 = 0.501$; $F[22.834]$, $p < 0.001$ }.

^aSignificant at the 0.05 level.

The results indicated that all four predictors explained a statistically significant ($p < 0.05$) amount of variance in change readiness, as none of the 95% confidence intervals for the tests of significance contained the value zero. Change message delivery was found to have the highest relative importance in predicting change readiness ($RW = 0.1942$), followed closely by change agent involvement ($RW = 0.1854$). Although statistically significant, project scope ($RW = 0.066$) and personnel position level ($RW = 0.056$) influenced change readiness to a much lesser extent. RWA revealed change message delivery and change agent involvement to have a much greater proportional contribution to change readiness than was revealed in a simple analysis of the unstandardized or standardized regression coefficients.

DISCUSSION

Change Message Delivery Reduces Fear and Uncertainty

Providing extensive change-related training to personnel who will be involved in implementation was found to be the most influential factor in creating change readiness. This finding is consistent with prior literature that has identified change-related communication, specific to the change initiative, its implementation, and related successes and challenges, to be a key driver of organizational change (Whelan-Berry and Somerville 2010). In their foundational article on the topic of change readiness, Armenakis et al. (1993) established a framework of five components that should be addressed in the content of the change message, along with three strategies of message conveyance. The present study augments the literature by specifically measuring the extent to which the change message was delivered to organizational members prior to the start of change implementation, a combination that has not before been addressed. Results from this research indicate a positive relationship between the extent of change-related communication prior to implementation and personnel acceptance during implementation.

One reason for the importance of delivering an extensive change message is that employees' individual feelings of self-efficacy must be considered prior to change implementation. Although employee feelings may remain unspoken, questions of "How do we actually do this?" and "Do we as an organization, and I personally, even have the capability to do this successfully?" are common. Previous studies have shown that greater uncertainty surrounding the change will result in greater resistance due to higher levels of fear and anxiety among organizational members (Giangreeco and Peccei 2005; Hultman 2006). Extensive delivery of the change message addresses these concerns by providing how-to training that describes the step-by-step actions employees will be asked to carry out. This information must be specific to the project role that each employee will fulfill on the project; for example, within the present study, contracting officers were often concerned with what RFP language must be inserted into their tender documents to describe new evaluation criteria, whereas project managers were more concerned with defining what the approach should be for conducting risk-focused planning meetings with an AEC firm prior to contract award.

Specifically within the AEC industry, a fundamental challenge facing planned organizational change implementation is that employees are being asked to depart from conventional project delivery processes that have typically been established over years of tradition and practice (Migliaccio et al. 2008). Change message delivery, therefore, is not only critical to provide step-by-step, how-to information, but also to

describe the organization's long-term, strategic objectives and intent of the change initiative. Balogun and Jenkins (2003) noted that change-related training should move beyond explicit details of the new processes and also generate new knowledge of the paradigm shift in how personnel understand their job functions in relation to the organization's strategic objectives. The present study adds empirical support for Balogun and Jenkins's claim by revealing a relationship between a greater extent of organization-level change training and personnel change readiness. When immersive training around the step-by-step, how-to aspects of the change process is coupled with a long-term and strategic perspective of how the change will bring benefits beyond the individual project level, the results of this study suggest that employee readiness is enhanced.

Change Agent Involvement Provides Support and Accountability

The level of participation of a change agent, or change champion, was found to have the second-greatest effect on personnel change readiness outcomes. This finding contributes to the literature by addressing Lyons et al.'s (2009, p. 461) concern that there exists a "paucity of studies" that have empirically evaluated the relationship between change leadership and change readiness. The results indicate that greater levels of change agent involvement at the implementation level (i.e., participating directly to help enact the new project delivery processes within a single project context) correspond with higher levels of project personnel change readiness. Previous literature supports this finding by noting that high levels of change agent involvement provide an avenue for two-way communication with organizational members tasked with carrying out day-to-day aspects of the change, which in turn serves to build personnel support for the change effort (Henderson and Ruikar 2010). Herold et al.'s (2007) study on transformational leadership also found that leaders influence levels of employee support for change initiatives.

High levels of change agent involvement also provide employees with a clear signal of the organization's long-term commitment to the change effort. If organizational leaders believe they can merely dictate organizational change and then expect their employees to follow suit, they jeopardize the credibility of the entire effort due to a lack of demonstrated "principal support" (Armenakis et al. 1993). Personnel who notice that the organization's leadership is not actively participating may feel that the organization is not "walking the walk," which can create the perception that the change is nothing more than the "flavor of the month" and lead to skepticism and lack of enthusiasm (Luecke 2003). A study by Todnem (2005) built upon Armenakis et al.'s (1993) original framework for creating readiness by identifying the importance of implicit communication, which consisted of nonverbal communication where change leaders and managers led by example to demonstrate the organization's commitment to the new processes. Our results provide strong support of these classic arguments about the importance of the change agent role by finding that extensive change agent participation, in the form of actually "walking the walk" at the day-to-day level of change implementation, is linked to higher change readiness.

Organizations Should Consider Project Factors during Implementation

Leaders who are responsible for leading the change effort are faced with the challenge of selecting which projects among the owner organization's entire project portfolio are appropriate candidates for implementation of new project delivery processes. When presented with the opportunity to introduce

changes in project delivery processes on either a construction, design and engineering, or facility services contract, owner organizations should be cognizant that construction projects have been found to respond in a more predictably favorable manner. This may indicate that the construction industry context has greater readiness for change, at least when the change content is related to project delivery processes.

Yet the authors strongly caution that project scope (as well as size and duration) should not be the only factors considered when choosing between project alternatives. The strategic value and organizational learning opportunities of each project must also be evaluated. Implementing planned organizational change is, by its very nature, a long-term and complex endeavor (Kanter 2003). Organization-level considerations may be even more important than project-level factors; for example, owner organizations must assess the long-term potential of their internal user groups to successfully respond to the change effort. For example, construction projects are often managed by a capital construction department, whereas a planning department may handle design and engineering work, and a facilities and operations department may be responsible for overseeing a variety of service and operations contracts. Each of these departments is constrained by differing project volumes, resources, and personnel, all of which are important strategic considerations that can affect long-term institutionalization.

Furthermore, owners must consider the potential return on investment when choosing between project opportunities. Kotter (1995) recommended that change practitioners strive to produce “short-term wins” to demonstrate the value of the change as a strategy to build commitment for the change among organization members. For an AEC owner, a service contract may have a broader effect across the organization, meaning that potential benefits of utilizing the new project delivery processes may result in greater savings that are also more visible to their personnel. These results could in turn be communicated within the organization as a success story pointing to tangible change benefits, which can drive even greater change readiness for future projects.

Change Readiness Is Influenced by Personnel Characteristics

A direct relationship between personnel change readiness and position level within the organization was found. Supervisors and executives who were involved in the project-level implementation of change were found to respond more enthusiastically than frontline personnel, such as project managers or contracting officers. This result may be reflective of the top-down nature of organizational change within the owner organizations that participated in the study. The initial decision to move forward with project delivery-related change was typically made at the supervisor and executive levels; supervisors usually supported the change as a method for improving performance within their respective departments and executives approved the resources necessary for implementing the change. Frontline personnel typically became actively involved only once approval for the change effort was already granted at higher levels within the organizational hierarchy. Perhaps unsurprisingly, the results then indicated that frontline personnel had a less favorable response to change implementation than their supervisors and executives.

Based on these findings, owner organizations are encouraged to seek feedback and participation from their frontline personnel during the initial stages of change-related planning and preparations. Previous studies have linked a lack of personnel participation in the change effort as a cause of resistance (Erwin and Garmin 2010; Rosenberg and Mosca 2011). Bamford and Forrester (2003) specifically identified

operational supervisors, who directly oversee frontline personnel, as perhaps being the most critical hierarchical level for accepting and leading change efforts. This is because operational supervisors occupy a cross-functional position that has the most direct contact with both operations personnel (where the brunt of day-to-day change implementation will occur) and department executives (who are often responsible for providing resources to support the change effort).

Recommendations for Practitioners

According to the preceding findings, the following recommendations are provided for change practitioners in the AEC industry, particularly to provide guidance when planning and assessing the antecedent conditions within their organizations prior to commencing change implementation actions:

1. Organizations must put serious consideration into their change management processes. Two foundational change management process elements, change message delivery training and change management leadership, were found to have a significant effect on fostering greater personnel acceptance of the change.
 2. The change message should be delivered to organizational members before those members are asked to partake in change implementation actions. If personnel are being asked to change their day-to-day operations, the organization's leadership is responsible to first, and extensively, explain how the change will affect each employee, their individual job function, and the organization's long-term strategy.
 3. Organizations that are serious about the change and truly view it as a strategic objective should demonstrate this by formally identifying a core group of change agents to lead the effort. This simultaneously signifies the organization's commitment to the change and provides employees with a direct point of contact whenever they have questions and concerns about the change effort.
 4. Change agents should possess both the willingness and the availability to directly participate in day-to-day change implementation deliverables. Achieving such extensive involvement may require that change implementation become designated as a true part of each change agent's job function.
 5. When faced with selecting candidate projects for new process implementation from a portfolio of numerous projects, AEC owners should take contextual factors into account. Certain project-specific factors, such as the project scope, may correspond with higher change readiness. Other projects may offer the potential to quickly generate success stories that help generate additional employee interest.
 6. Frontline personnel demonstrated lower change readiness outcomes than supervisors and executives. Change leaders may consider soliciting participation from frontline individuals who are considered to be open to change, since their individual support and enthusiasm are critical drivers of change implementation success.
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CONCLUSION

The objective of this study was to investigate the manner in which specific change management factors influence the way organizational change is received on the project level in the architecture, engineering, and construction industry. A data sample of 17 different owner organizations, each implementing the same organizational change objectives, participated in a longitudinal action research study. Results from correlation analysis and variable selection testing found a best-fit multiple regression model for predicting change readiness of AEC project teams during the implementation of new project delivery processes. Extensive change message delivery was found to have the greatest relative importance (RW = 0.1942), followed closely by level of change agent involvement with project-level change implementation (RW = 0.1854). Project scope (RW = 0.0658) and personnel position level (RW = 0.0555) accounted for a far lesser, although still significant, amount of the variance in change readiness. This study represents a contribution to change practitioners as well as the body of knowledge in AEC and organizational behavior research by empirically investigating antecedents of individual change readiness, which Rafferty et al. (2013, p. 121) noted that only a small number of previous studies have done. Providing organizational members with appropriate change-related training should not be overlooked and has the benefit of improving organizational members' feelings of participation, self-efficacy, and comfort with the change effort. Internal change agents must be formally designated and prepared for high levels of engagement on the project level of change implementation. This provides change-related support to organizational members, communicates the organization's strategic commitment to the change, and keeps leadership in touch with the emotional responses of their personnel.

Limitations and Recommendations for Future Research

Although the best-fit regression model has significant explanatory power, nearly 50 percent of the variance in change readiness was unexplained by the change management factors measured in this study. Additional factors should be considered in future research, including the transformational leadership characteristics and actions of change agents (Jansen et al. 2009); the organization's historical frequency and success with previous organizational change efforts (Walker et al. 2007); and various aspects of organizational culture, such as trust, bureaucracy, and values (Luecke 2003).

Perhaps the most surprising result of this study was the relative unimportance of personnel characteristics. The authors do not necessarily conclude that personnel characteristics have a small effect on change readiness; rather, these results are likely indicative of the fact that the two personnel characteristics observed within this study (position level and career stage) may not be the key personnel characteristics that influence change readiness. Prior research has hypothesized that individual personnel may each have a varying "predisposition" or "openness" to supporting organizational change (Bareil et al. 2007). Future research is recommended to consider the relationship between AEC personnel readiness for change and individual personnel personality traits, emotional intelligence, influence styles, and leadership characteristics; based on their extensive experience observing and implementing organizational change in the AEC industry, the authors believe these soft-side characteristics likely influence change readiness and are recommended as important areas of future research.

The study was limited to a single measure of change readiness as opposed to a multicomponent measure. Although using a behavioral continuum is preferable to using dichotomous measures (i.e., whether an employee resisted the change or not), multi-component measures are considered to have greater accuracy and reliability (Coyle-Shapiro 1999; McIver and Carmines 1981, p. 15). Future research is recommended to incorporate multicomponent measures. One advantage of the behavioral continuum employed within the study was that it linked change acceptance and rejection, which are commonly studied as disparate topics. The resulting measure resulted in a single intensity scale of change readiness behavioral outcomes separated by a neutral transition zone.

This study was also limited to measurement of change readiness at the individual level. Rafferty et al. (2013) have called for studies to also examine change readiness at the work group and organizational levels based on their observation that relationships found at one level of analysis may be stronger or weaker than at a different level of analysis. Since this study was limited to the individual level of measure, the discussion and analysis were purposefully focused on the individual implications of change readiness in order to minimize generalizations at the work group and organizational levels.

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