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Management Practices that Lead to Successful Change Initiatives in the AEC Industry: An Interdisciplinary Approach

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In today's rapidly changing market, effective organizational change adoption has become a core competency for many Architecture, Engineering, and Construction (AEC) organizations to maintain competitiveness. Many barriers and hindrances stand in the way of the successful adoption of an organizational change initiative, with employee's resistance to change being primary among them. The objective of this study was to investigate the relationship between utilizing specific change management practices for achieving a successful change adoption and favorable employee reaction to that change. A data set of 428 change initiatives from numerous AEC organizations across North America was analyzed. The results show that certain practices such as utilizing change agents to support the change adoption, providing a realistic timescale of the change to the users (and keeping them updated with the progress of change), utilizing the practice of communicating the benefits of change, and providing training resources to the employee, can contribute to both a successful change adoption and favorable employee reaction. This study contributes to the body of knowledge by analyzing an under-researched dimension of change adoption in the AEC industry. This study also helps industry practitioners by identifying key organizational change management practices for successful adoption of change and favorable employee reactions to change.

Key Words: Organizational Change Management (OCM), Change Adoption, Employee Reaction, Architectural, Engineering, and Construction (AEC)

Introduction

To remain competitive in the industry, companies are constantly evolving by incorporating best practices to effectively deliver projects. Incorporating best practices typically requires an organization-wide change initiative (Rahman, 2014). The AEC industry is no different where companies are implementing new changes to drive future growth. These could be categorized as the adoption of new technologies, which include but are not limited to building information modelling

(BIM), mobile technology, scanning technology, sensor technology, virtual reality, augmented reality, safety monitoring, unmanned aerial vehicles, remote-controlled construction equipment, and 3D printing. Changes can also be to the organization's existing management processes, such as utilizing alternate project delivery methods of Design-Build (D-B), Construction Manager at Risk (CMAR), or Integrated Project Delivery (IPD) method, or utilizing alternate procurement methods of best value (BV) or Qualification-based Selection (QBS). Furthermore, changes can also be to the organization's structure, such as mergers, acquisitions, hierarchical reorganizations, establishment of prefabrication and modular construction departments, entering new markets, etc.

In the AEC industry, undertaking an organizational change is considered a steep uphill task. The AEC industry has been known to adopt changes at a slower rate compared to other industries (Gholizadeh et al., 2018), and there may be reluctance to transition away from conventional processes that have been used for decades (Migliaccio et al., 2008). Further, there are variations in the degree of achieved adoption between companies due to the different change management practices they employ (Lee and Yu, 2016). In this context, organizational change management (OCM) is defined as the steps to implement practices that are different from the organization's current practices, with the intent to achieve organization-wide goals (Burnes, 2009).

When conducting a company-wide change, employee resistance to change is a major roadblock, and hence organizations should focus on fostering favorable employee reactions while implementing a change (Lines et al. 2015). It has been widely recognized that employee reactions affect change adoption in the past organizational change literature (Self & Schraeder, 2009). Facilitating positive reactions among the employees can increase the likelihood that the change will be successfully adopted. However, little information exists regarding OCM practices that can foster both favorable employee reactions and drive successful change. The authors intend to fill the gap by analyzing 428 change initiatives from various AEC organizations across North America. The research objective was to identify key OCM practices to be undertaken to drive successful change adoption and reduce employee resistance by increasing favorable employee reaction to that change.

The overall objective of this study was to determine OCM practices based on their correlation with successful change adoption while fostering favorable employee attitudes towards that change in the AEC industry. To achieve the objectives, a survey questionnaire was used to collect 428 cases of organizational change efforts. The questionnaire was designed such that each data point represented a single organizational change initiative that occurred within an organization in the AEC industry.

Literature Review

Organizational Change Management in the AEC Industry

An interdisciplinary approach was used to identify the key OCM practices that would drive successful change adoption and fosters positive employee reaction to those changes. The literature review was conducted with an interdisciplinary focus by examining key change management practices from the field of organizational behavior, where change management practices from the organizational behavior literature were coupled with examples of documentation within the AEC literature. OCM theory was published as early as 1947, where Lewin (1947) proposed a three-phase approach to change implementation. Similar research followed suit by also recommending different change models comprised of various steps, milestones, and phases (Burnes, 2009; Luecke, 2003). However, the gist of the theory remained the same that OCM requires a systematic approach to implement the

change and is dependent on certain practices. In the context of the AEC industry, organizations that are better at adopting changes have a competitive advantage and can cope with increased market pressure to improve productivity, reduce costs, enhance safety, and increase sustainability (Loosemore, 2014).

Previous studies regarding the use of OCM practices to achieve successful change adoption within the AEC industry were generally limited by either a small dataset or studying a specific type of organizational change. Limited studies have investigated OCM practices in the AEC industry and provided best practices for managing the change process to achieve maximum benefits (Erdogan et al., 2014), while little to no study has analyzed how various OCM practices influence employee resistance to change in the AEC industry. The following sections talk about the most common OCM practices, successful change adoption, and employee reaction to changes, which would be used for the analysis of this study.

Organizational Change Management (OCM) Practices

A literature review using an interdisciplinary approach was used to identify six OCM practices that have consistently been recommended in the organizational change literature to achieve better adoption and overcome barriers and resistance. These six management practices include:

- *Senior-leadership commitment*: senior leaders should justify the purpose of the proposed change and must be committed throughout the entire change-adoption process (Armenakis et al., 1999) to support the progress of the change in the organization (Emiliani and Stec, 2005).
- *Communicated Benefits of Change*: this OCM practice consists of conveying the change message to employees to reduce their resistance to that change (Erdogan et al.,2014).
- *Establishment of a realistic timeframe for change adoption:* understanding the amount of time needed for employees to successfully implement the change and reduce resistance due to impractical timeline (Smollan, 2011).
- *Change agent effectiveness:* change agents are oftentimes known as the internal champions of the change (at the execution level rather than senior leadership) and play an important role in change implementation (Wolpert, 2010).
- *Establish clear and measured benchmarks of change progress:* this OCM practice helps in clear benchmarking of the required change outcomes by actively measuring the progress of change throughout the project. It is an important strategy for building change momentum (Lines and Vardireddy, 2017), creating short-term millstones and celebrating it, will recognize and reward employees who have been actively involved in the change (Kotter, 1995).
- *Training resources:* employees involved in change implementation typically have change-related training, meetings, and other activities added to their workloads. To implement the full potential of a change, organizations need to invest in training (Chang et al., 2017).

Employee Reactions

Employee reactions are a major factor in helping organizations adopt a change and sustain it so that the change becomes a part of the organizational culture. Resistance as a reaction to change is one of the most significant barriers to achieve successful change adoption (Peansupap and Walker, 2006). Crew (2017) identified that resistance and unwillingness to adopt changes is one reason for productivity decline over the past 50 years in the AEC industry. Previous research in the AEC industry has also identified that to attain favorable employee reaction to change adoption, certain practices are needed, such as communication, change-related education and training, and involvement

in the change implementation process (Henderson and Ruikar, 2010). This study uses a spectrum of observable reactions that were modified from previous scales developed by Bovey and Hede (2001).

Employee reactions to change as developed by Bovey and Hede (2001) is measured on a spectrum from supportive to resistive behaviors. Supportive reactions to change include active participation, willingness to participate, committed participation, and other supportive action. Resistive reactions include passive and active behaviors such as opposition, avoidance, and resistance.

Successful Change Adoption

Successful adoption of change is the end goal of every change initiative. This study used three factors to measure adoption, which are based on previous studies and include achieved benefits of the adoption, sustainability of the adopted change in the organization's long-term operation, and the achievement of the intended goals (Lines and Vardireddy, 2017; Maali et al., 2020).

Methodology

Survey Design, Distribution, and Collection

The questionnaire was sent to a wide range of architecture, engineering, construction, and owner representatives' firms across North America. Email addresses were gathered from private, public, and professional groups and organizations in the AEC industry, particularly from 17 organizations, however more responses were obtained by using a snowball technique, therefore, an exact number of organizations that were surveyed cannot be determined. In total, 428 individuals responded to the survey, representing a wide spectrum of organizations in the AEC industry. Each respondent provided information about a single case of change adoption that they recently experienced.

The survey was sent out electronically with a brief description of the questionnaire and two sections. The first section was focused on the demographics, which included, sector type, organization type, hierarchical position, years of experience, and general affiliation of the participant. The second part consisted of questions to respondents where they were asked to identify if they were part of any recent organizational-wide change initiative and what was it about. The later part of the second section was focused on different OCM practices used by their organization to implement that change, how successfully the change was implemented (including successful and unsuccessful changes), and the prominent employee reaction to those changes. OCM practices were measured on six common practices (as shown in table 1), successful change adoption was measured using Change Adoption Construct (CAC) which was calculated using the three factors (as shown in Table 2), and lastly, employee reaction was measured using one item (as shown in Table 3).

A total of 428 change cases were analyzed for this study. Of the responses received, 34% were public organizations, 10% were private, and the rest did not choose to identify themselves. Regarding organization type, there are 48% owners, 26% general and sub-contractors, 9% architecture and engineering firms, 10% other types of firms, and only 6% did not choose to respond. In terms of change experienced, 38% experienced a technological change (software and hardware), 40% experienced a change in management process (project management and delivery), and 22% experienced a change in the business process (business improvement methods and structures). In terms of hierarchal position in the company, 50% were part of upper management, 33% from middle management, and the rest chose not to identify themselves. Lastly, 40% of responses had 30 plus

years of experience, whereas, people with 10 to 30 years of experience constituted 44% of the responses, 7% had less than 10 years and the rest did not choose to answer.

Definition of Variables

The implementation levels of OCM practices were measured for each of the six practices using a 7-point Likert-type ordinal scale (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, and 1 = strongly disagree). Table 1 below shows the definition of each of the six OCM practices.

Table 1

Recommended OCM Practices

OCM Practice	Definitions
Senior-leadership commitment	The organization's senior leadership was committed to the organizational change initiative ("walked the talk").
Communicated benefits	Employees had a clear understanding of how organizational change would benefit them personally within their specific job functions.
Realistic timeframe	The speed at which the organization implemented the change was appropriate and achievable.
Change-agent effectiveness	The change agents responsible for leading and managing the change initiative were effective.
Measured benchmarks	The organization established clear benchmarks for evaluating the success of the change initiative (with reference to previous performance).
Training resources	Employees had a clear understanding of the action steps necessary to implement the change within their specific job function

Three factors; sustained long-term, produced beneficial impacts, and achieved desired goals were used to measure successful change adoption to develop the CAC. These factors were also measured on a 7-point Likert-type ordinal scale. CAC as used in the previous research (Lines and Varireddy, 2017; Maali et al., 2020) is a reliable and good indicator of the change adoption in the AEC industry. Principal Component Analysis (PCA) was performed to establish a composite measure of the three measures; this composite measure, named the CAC, represents the organization's level of success in adopting a change. High scores of CAC represent a high level of organizational change being successfully adopted, whereas low scores represent a low level of organizational change being successfully adopted. Table 2 below shows the description of CAC and the three factors.

Table 2

Successful Change Adoption measured using Change Adoption Construct (CAC)

Change Adoption Variables	Definitions
Sustained long-term	Sustained long-term Organizational change adoption was sustained long-term within the company's operations (3 or more years).

Produced beneficial impacts	Organizational change adoption resulted in a positive or beneficial impact on the organization.
Achieved desired goals	Organizational change adoption achieved the desired outcomes within the organization's operations.
Change Adoption Construct (CAC)	Overall organizational change adoption was measured as the linear composite of optimally weighted change adoption variables.

Lastly, Employee Reactions were measured using one item on an 8-point Likert-type scale, ranging from 1 = "Initiating, Embracing, Championing the Change" to 8 = "Obstructing, Opposing, Arguing (Openly Opposing) the Change". These types of reactions were selected and categorized based on definitions in the literature (Bovey and Hede, 2001; Emiliani and Stec, 2005). The study participants selected up to three employee reactions that were most prevalent regarding the change adoption. The average score for each of the three-score selected was used to analyze the average employee reaction to the change. Table 3 below shows the distribution of the employee reaction scale.

Table 3

Spectrum of Employee Reaction and it is Definition

Scale	Spectrum of Employee Reactions	Definition of Observable Employee Reactions
8	Championing	Initiating and embracing the change in the organization
7	Actively Supporting	Supporting the change within the organization
6	Passively Supporting	Accepting the change
5	Reluctantly Complying	Just going with the change
4	Passively Avoiding	Ignoring, withdrawing, avoiding the change
3	Openly Not Participating	Refraining, waiting, observing the change
2	Covertly Opposing	Stalling, dismantling, undermining the change
1	Overtly Opposing	Obstructing, opposing, arguing the change
-	Employee Reaction Score	An average score of the reported reactions per organization

Research Analysis

Spearman's rank-order correlation was used to establish bivariate relationships between individual OCM practices with CAC and employee reaction score. Spearman's rank-order correlation was utilized instead of Pearson Correlation as it was a non-parametric test and a common analytical approach for use with ordinal data measures (McClure, 2005). All assumptions for Spearman's rank-order correlation were met.

Results

The relationship between OCM practices and CAC was conducted using Spearman's rank-order correlation. Based on an established scale of small, moderate, and strong correlation for Spearman's rank-order correlation by Cohen (2013) for behavioral and social science studies, the results of the analysis, showed that every OCM practice undertaken to implement a change in the AEC industry had a significantly strong correlation (shown in Table 4) with the CAC, at a p-value of 0.01.

Spearman's rank-order correlation when conducted between the OCM practices and employee reaction score also yielded significant results. Table 4 below shows every OCM practice had a significant correlation with employee reaction score, at a p-value of 0.01. Similarly, using Cohen's (2013) established scale, of the six OCM practices communicated benefits of the change was the only practice with small correlation, while all other practices tended to have a moderate correlation with employee reaction.

Table 4.

Spearman's Correlation between OCM practices and CAC and employee reaction score

Dependent Variables	Organizational Change Management (OCM) practices					
	Communicated Benefits	Senior leadership Commitment	Realistic Timescale	Training Resources	Change Agents	Measured Benchmarks
CAC	.632*	.562*	.623*	.559*	.697*	.575*
Employee Reaction Score	.276*	.347*	.398*	.377*	.366*	.332*

*Correlation is significant at the 0.01 level (2-tailed)
† Cohen (2013) Established Statistical Correlation Scale for Behavioral and Social Science Studies
$0.1 < |r| < 0.3$ → Small Correlation
$0.3 < |r| < 0.5$ → Moderate Correlation
$|r| > 0.5$ → Strong Correlation

Discussion

When utilized, the six OCM practices were found to positively impact change adoption. The significant results showed that any of the OCM practices when undertaken by an organization tended to successfully adopt the change, compared to when they were not utilized which tended to lead to unsuccessful change adoption. Of the six OCM practices, using change agents to implement a change, communicating benefits of the change, and providing a realistic timescale of the change had the strongest correlation with 0.697, 0.632, and 0.623, respectively. These results were consistent with previous studies in the AEC industry, which have also found that these OCM practices lead to successful change adoption (Maali et al., 2020).

Similarly, the six OCM practices when utilized to implement a change also tend to positively inculcate favorable employee reaction. The significant result showed that any of the OCM practices when undertaken by an organization tended to foster favorable employee reaction to a certain degree. Although the correlations are not as strong as those with CAC, of the six OCM practices realistic timescale of change, training resources provided for the change, and using a change agent to implement the change were the top three practice that affected favorable employee reaction to the most, with a correlation of 0.398. 0.377, and 0.366, respectively.

When analyzing the research holistically, companies that either have a limited budget or other organizational constraints or want to optimize the change implementation process can implement certain OCM practices that can lead to both successful adoption and increased favorable employee reaction. Based on the results of the study, organizations can apply OCM practices of utilizing change agent to drive a change adoption and providing a realistic timescale of the change to the users (and keeping them updated with the progress of change), can greatly impact both, change adoption and employee reaction, significantly. Furthermore, in an organization where one variable of the two (CAC and employee reaction) is considered to be a key performance indicator of change, the change

management process can be tailored to cater to that variable. For instance, in addition to the two aforementioned OCM practices that affect both variables significantly, if successful change adoption is the one performance measure of the change management process, organizations could also utilize the practice of communicating the benefits of change to further enhance the chances of successful change adoption. On the flip side, if enhancing favorable employee reaction is a key performance measure, organizations could provide better training resources to foster favorable employee reaction.

Conclusions and Limitations

Change management is an integral part of any organization and it is no different for the AEC industry. For organizations to keep themselves competitive in the industry, organizations must ensure that the change was successfully adopted, and employees are positively adopting that change. Change adoption research is limited in the AEC industry, either by sample size, limited types of changes, or limited to a specific type of organization. The authors analyzed 428 change initiatives across multiple organizations in the AEC industry across North America, to determine the OCM practices that can help successfully implement change adoption and increases favorable employee reaction at the same time. Industry professionals can use the most significant OCM practices, which include using change agents to implement a change, communicating benefits of the change, and providing a realistic timescale of the change, to better strategies adoption giving favorable employee reaction. That said, this study was limited to change initiatives in AEC organizations within North America. Furthermore, only 6 OCM practices were analyzed in this study, although these are the most significant practices as found in literature, other practices can also be analyzed for future analysis.

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