CREATING A CLIMATE FOR PROJECT SUCCESS

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• ABSTRACT •

Project Success is known to be influenced by many individual factors: organizational, technical and psychological/social. In this paper, we build on organization and IS theory to propose a second-order factor called Climate for Project Success. Climate is a useful concept in that, unlike culture, it is comprised of elements that a project manager can influence. Three dimensions (top management support, sufficient resources, and willingness to adapt) are identified and tested to measure their ability to predict different aspects of project success. Results of a regression analysis of data from 449 projects showed that Climate for Project Success was a significant and strong predictor of both Stakeholder Success (R^2 =.346, p=.000) and Budget/Time success (R^2 =.154, p=.000). Top Management Support and Willingness to Adapt positively influenced Stakeholder Success; Top Management Support positively influenced Budget/Time Success. Interestingly, Budget Flexibility, an element within the Sufficient Resources dimension, was negatively related to both Stakeholder and Budget/Time Success. Further ANOVA testing identified variables with weaker but significant influence on Project Success.
We conclude that Climate is a useful academic and practitioner concept and research could identify additional dimensions to predict Budget/Time Success. Organizations that wish to improve their project success should focus on developing a Climate which includes senior management support, stakeholder engagement, fully dedicated teams, support for agile methods, frequent meetings with product owners and a good team attitude toward accepting changes.

INTRODUCTION

There are many factors that have been identified as contributing to project success (Pinto and Slevin, 1987, Umble, Haft, and Umble 2003; Yeo, 2002). Reviews of this literature finds that the factors reported contain both organizational, technical and psychological/social elements. Success itself has been studied with academics suggesting that there are multiple dimensions that need to be considered (Müller and Turner, 2007; Shenhar, Levy, and Dvir, 1997). In this article, we make a first attempt to group influential variables into a higher-level construct, called Climate for Project Success and to test its ability to predict several types of project success. It is our hope to move beyond individual variables for the benefit of research but most importantly for practitioners, who may take guidance from a set of self-reinforcing behaviours as they struggle to implement large, complex projects in organizations.

In this introduction, we briefly introduce the climate construct and the multiple perspectives on project success. In following sections, we delve more deeply into these research areas, and then describe our exploratory empirical study that examined the relationship between them. As is often the case in research, we have some answers and more questions for further exploration.

Organizational researchers began their interest in climate as a predictor of important outcomes three decades ago, noting that employees form their perceptions by observing how the daily operations of the organization are conducted and what goals the organization appears to be pursuing (Kopelman, Brief & Guzzo, 1990). Climate has been defined as "the shared perceptions of employees concerning the practices, procedures, and kinds of behaviors that get rewarded and supported in a particular setting" (Schneider, 1990: p. 384). Climate is purposeful (e.g. Climate for Safety, Climate for Diversity) and is a construct which is subjective, temporal, and able to be manipulated by managers (Denison, 1996).

It was these latter characteristics of climate, namely its temporal nature and its ability to be affected by managerial actions that interested us as project management researchers. Projects are temporal, with heterogeneous members and known constraints. Climate, as opposed to culture, which reflects core values and fundamental ideologies and assumptions (Schein, 1992; Trice and Beyer, 1993), reflects the temporal nature of projects. Project managers might be able to create a certain "climate" within their projects which could be influential throughout the project's lifecycle. One can imagine a Climate for Innovation, or a Climate for Quality which, if established early enough, might influence team members' actions and ultimately impact project results. In this research, we explore the composition and influence of a new construct called "Climate for Project Success".

Project success has been measured in a variety of ways. Early measures of project success focused on meeting the "triple constraint" (Shenhar, Levy, and Dvir, 1997; PMBOK®, PMI®, 2003) of time, budget and scope. These are still widely used and considered fundamental to all project types. However, current thinking expands these success criteria. Ultimately, project success is best judged by the stakeholders, especially the primary sponsor, (Turner and Zolin, 2012). Cooke-Davies (2002) separated these perspectives, calling the former "project management success and the latter "project success". The importance of broader success measures for projects is now the norm. The PMI® PMBOK® guide, as an example, no longer just mentions the triple constraint, (PMI®,`, 2013). It also refers to stakeholder satisfaction. In this research, we consider both measures of success, calling one "project efficiency" (Shenhar and Dvir, 2007) and the other Stakeholder Success (Serrador and Turner. 2015)

In the sections below, we expand our discussion of a construct called Climate for Project Success and outline a preliminary set of dimensions for this construct. We also further discuss the dimensions of project success.

CLIMATE FOR PROJECT SUCCESS

Recent research (Reich et al, 2013) has called for a tighter link between organizational and project management research, and a focus on adapting organizational constructs into the particular world of the project. Following this advice, we first delve into the organizational literature on climate and then propose dimensions of a Climate for Project Success based on prior research and project theory. This research is exploratory and designed to find the nature of the relationship between climate and various aspect of project success.

Climate is a higher order construct, composed of variables that, taken together, can be shown to influence an outcome variable. It is a strategic construct, in other words, it has a "purpose", which is signaled by its name, such as "climate for safety" (Wang, Leung and Zhou, 2014). In this paper, our intent is to begin the development of a "climate for project success" construct that can be used by researchers in nomological networks involving managerial actions, organizational policies and routines that impact the success of projects.

A climate construct can be established at two levels, organizational and psychological. James and Jones (1974) described individuals' perceptions of the workplace as psychological climates and the combination of these individuals' perceptions at the group or organizational level as organizational climate. Thus, one could compare the organizational "climate for innovation" of two departments by surveying individuals and aggregating their scores into departmental metrics. Or one could survey a representative group of individuals in a population, and report back on how each person's psychological climate for innovation compares to population statistics.

In the organizational climate theory literature, seminal research was done in the retail banking context (e.g., Schneider and Bowen, 1985; Schneider et al., 1980, 1996, 1998). This research demonstrated a strong relationship between the bank's "service climate" experienced by bank tellers and the "service quality" perceived by clients. This research is foundational, but the context differs on an important dimension from work done within a project. The context is one of routine work, repeated many times throughout the day - i.e. a bank teller serving a client. It does not represent the deeper knowledge work that team members are engaged in, work that is subject to change. A more recent study (Jia, Reich and Pearson, 2008) studied climate for service in a knowledge context – reporting on IT teams that provide service to their internal client groups. This research established a new construct, IT service climate, as a predictor of perceived service quality, and developed several dimensions of this construct. The difference in perspective between routine work and knowledge work is discussed in Jia, Reich and Jia(2016).

IT Service Climate has been investigated at both an organizational (Jia and Reich, 2011) and an individual level (Lowry and Wilson, 2016). In both studies, a three-dimensional model was validated, comprised of Service Vision, Service Leadership, and Service Evaluation. It was found that managers who regularly discuss the importance of service to clients, who develop new ways to serve clients, and evaluate team members on their service to clients can create a climate which is positively associated with client's perception of service quality. In other words, managerial actions, interpreted by team members, led to behaviours by them that affected clients' perception of service quality.

This research considers the potential dimensions of a construct called Climate for Project Success. It looks for behaviours, practices and policies that project managers and sponsors can influence and suggests three for initial consideration. One can immediately recall the many studies showing the value of top management support and engagement (Poon, Young, Irandoos and Land, 2011; Johnson, Boucher, Conners, and Robinson, 2001), and imagine that a project team member who observed top management taking an active interest in their project might feel that the project was set up for success. Similarly, perceptions that the project had sufficient resources, such as people, budget, and time, should give team members a positive expectation about the possibility of project success. Finally, perceiving that management and team members were willing to adjust expectations based on results, to accept change during the project, should give comfort that the project could face any challenges that it encountered (Ibbs, Wong and Kwak, 2001). Thus, our initial list of dimensions includes top management support, sufficient resources, and willingness to adapt[1]. A brief recap of the literature support for each follows.

TOP MANAGEMENT SUPPORT

While many studies have shown the value of support of top management, Pinto and Slevin (1989, p.35) define this concept in a way that team members can perceive it, taking it out of the realm of conjecture. They write that "Top management can either help or hinder a project. Top management grants necessary authority to the project manager, controls needed resources, and rewards the final results...When the actual work of the project is being performed, it is important that top management make it presence known by providing the necessary money, manpower, and raw materials for the project as they are needed. Further, project managers need to know that top management will support them in the event of unforeseen difficulties or crises." Thamhain (2004) suggests that technical expertise or good leadership alone is not enough for creating a supportive project environment for the team, excellence across a broad range of skills and sophisticated organizational support including top management support is required to for project teams to perform effectively.

SUFFICIENT RESOURCES

From a team member's perspective, there are several perceptual clues that the project is well resourced, including team member availability and budget sufficiency. The risk of allowing core team members to be assigned to multiple projects is that they are neither available when their inputs are most needed nor as committed to project success as their peers (Clark & Wheelwright, 1992). Hobday (2000), comparing different project structures, points to the difference that dedicated team makes, saying "Overall, the project suffered from weak team coherence, poor team spirit, and fragmented communications…due in part to initial project under-resourcing…a reflection of the PM who was unable to insist upon a dedicated team… By contrast the [other] team felt a strong team coherence and close identity with [the other project, since] most of the team were dedicated to [it]."

Although budget is often an inflexible constraint, many projects encounter dynamic requirements and have to undergo many changes such as technology upgrades, new critical features implementation and requirements for cross-domain expertise (White and Fortune, 2002) which will all need extra budget for successful delivery. Therefore, the perception that management will make the necessary budget available is a potential element in the Climate for Project Success.

WILLINGNESS TO ADAPT

Managing change is an integral part of project management. Ibbs et al. (2001, p.159) defines change as "any additions, deletions, or other revision to project goals and scope are considered to be changes, whether they increase or decrease the project cost or schedule" and suggests that project management teams must have the ability to respond to change effectively. Our perspective is that this dimension of Climate for Project Success would mean that individual team members perceive that both their fellow team members as well as management will make any changes necessary for the project to succeed. Behaviours that exemplify this openness to change are most often associated with agile project approaches, but could be found in any team that practices reflective thinking and learns as the project proceeds. According to Dybå and Dingsøyr (2008), agile methods have grown steadily in adaption. A key characteristic of agile is: "High-quality adaptive software is developed by small teams using the principles of continuous design improvement and testing based on rapid feedback and change" (p. 836) Serrador and Pinto (2015), in reviewing 1100 projects, report that projects which employ agile practices are more successful than traditional projects.

THEORETICAL MODEL

In this exploration of the Climate for Project Success construct, we used prior project-based research to identify potential dimensions and existing survey data to test the model. The survey available to us included nine variables that could be considered part of the dimensions of the Climate for Project Success. It also included variables allowing us to measure both Project Efficiency (time and budget success) and Stakeholder Success.

Our exploratory model looked as follows: 3 dimensions of Climate for Project Success potentially influencing both Stakeholder Success and Time/Budget Success.
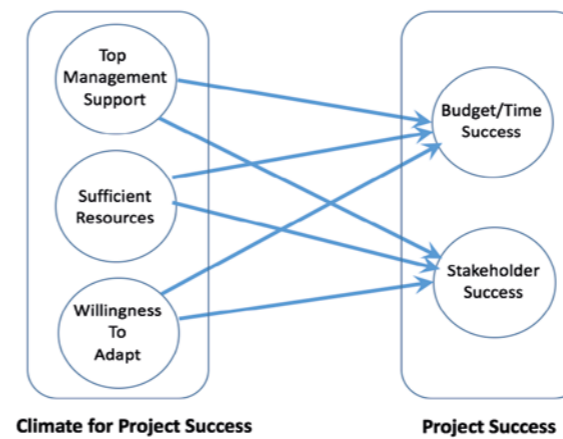

Climate for Project Success   **Project Success**

FIGURE 1. Research Model

RESEARCH METHODS

Data for this study comes from a survey which considered factors impacting project performance. The survey was collected through a variety of channels including members of the Project Management Institute, LinkedIn project management groups, researchers' contact lists and other project management sites/discussion groups.

A total of 296 respondents provided information on 528 projects. After removing invalid data, a total of 449 projects was provided for the analysis. The average reported project budget across the 449 projects was 3.46 million ($US) with an average duration of 13.7 months. On average, each project had 22 full time equivalent (FTE) positions working. All respondents were project managers with an average of 13.7 years of experience. Approximately 19% of respondents were female. Descriptive statistics of the projects and project managers included in the sample are provided in **Table 1.**

MEASURES

Both project performance and climate for project success are multidimensional concepts. In developing measures for project success, items from previously developed scale measures were used whenever possible. Since project climate for success is a new construct, no previous measures have been developed so several exploratory variables are proposed below.

--- Dependent Variables: Project Performance ---

As in previous studies, project performance was broken into multiple aspects of performance success (Gable, Sedera and Chan, 2008; Serrador and Turner, 2015): Budget/Time Success; Stakeholder Success; and Scope/Quality Success. For Budget/Time Success, the measures focused on the level to which goals for budget and project schedule were met. This is similar to the Project Management Performance measures used in Gemino, Reich and Sauer (2008). For Stakeholder success, the items were related to the feedback from

Survey Participants (Project Managers)	
Average Age	38.8 years
Average Years of Exp.	13.7 years
PM Certifications	Over 90%, with PMP, PMI-ACP and Scrum Master (CSM) as the most common
Project Characteristics	
Average Budget	$ 3.46M US$
Average Duration	13.8 months
Average Team Size	22.08 Full Time Equivalents
Industries and Project Type	
Common Industries	Financial Services (14%); Software (12.9); Manufacturing (11.8); Hi Technology (9.6); Telecommunications (7.6%)
Common Types of Projects	Software (58.4%); Business Process (8.9%); Services (8.0%); New Product Development (6.5%);
Internal vs. Vendor	Completely internal (30%); Mixture of Internal and Vendor (59.5%); Mostly Vendor (10.5%)
TABLE 1. Descriptive Summary of Survey Participants and Projects	

Budget/Time Success	Average of: 1) Meeting budget goals 2) Meeting timeline goals
Stakeholder Success	Average of: 1) Sponsor feedback 2) Team feedback 3) Client feedback
Scope/Quality Success	Average of: 1) Meeting scope/requirements goals 2) Meeting quality goals
TABLE 2. Summary of Success Measures of Project Perform	

three stakeholders: sponsors, clients, and team members. Scope/Quality Success was measured by the perceived achievement of goals for project scope and overall quality.

These success measures of project performance are summarized in **Table 2**. All measures were collected on a 7 point Likert type scale based on the judgement of respondents.

To better understand how these various project performance factors relate to each other, we performed a factor analysis. **Table 3** provides the output from this analysis. We used normalized variables with varimax rotation. The results indicate two primary factors, one focused on stakeholder success and the other on meeting budget and timeline goals. The results for meeting scope goals were mixed across these two factors with small loads on each factor. The results for meeting quality goals aligned more the stakeholder success but was the weakest element. For this reason, we proceeded with stakeholder success and budget/time success in the analysis.

A Cronbach alpha analysis was undertaken to consider the internal reliability of the Stakeholder Success dimension and the Budget/Time success dimension. The strong factor analysis results were supported by strong reliability results. The alpha of 0.913 for Stakeholder Success indicated a strong association between the three aspects of stakeholder success (Nunnally, 1978). The alpha of 0.770 for Budget/Time Success shows a moderate association between budget and timeline success.

--- Independent Variables: Climate for Project Success ---

The earlier discussion outlined three dimensions of Climate for Project Success including top management support, sufficient resources, and willingness to adapt. Several questions relating to these dimensions were present in the survey. We used the variables in **Table 4** as a starting point for the exploration. All variables are expected to have a positive relationship with the dependent variables.

Factor Loadings (Varimax Normalized) Extraction Principal Components (Marked Loadings are > 0.7)		
	Factor - 1	Factor - 2
Client feedback	.882	.259
Sponsor feedback	.851	.278
Team feedback	.822	.280
Meeting budget goals	.222	.885
Meeting timeline goals	.343	.817
Meeting scope & requirements goals	.630	.367
Meeting quality goals	.818	.219

TABLE 3. Factor Analysis of Project Success Factors

Item/Variable	Question Text and [Reference]	Measure
Survey Variables: Top Management Support		
Senior Management Support	How supportive was senior management of this particular project and goals	Likert: 1 low to 5 highly supportive
Degree of Stakeholder Engagement	How engaged were the key stakeholders for the project?	Likert Type: 1 low to 5 highly engaged
Frequency of meetings	How often does the business representative (product/business sponsor) meet with the project team?	1 – Every 6 mths 2 – Every 2 mths 3 – Monthly 4 – Weekly 5 – Daily
Survey Variables: Sufficient Resources		
Amount of budget flexibility	How much flexibility was there in the project budget?	Likert: 1 low to 5 very high flexibility
Team fully dedicated to project	Was the team 100% dedicated to the project? If not what was the team's dedication to the project?	Likert: 1 Low to 5 completely dedicated
Team Collocated	Where were the team members located? Choose the option that best fits the majority of team members.	1 Internationally 2 Nationally 3 Same city 4 Same office
Survey Variables: Willingness to Adapt		
Team attitude toward accepting changes	How well did the team and the project respond to external changes?	Likert: 1 low to 5 very high accepting of change
Senior management support for agile	How supportive is senior management of the adoption of agile methodologies in general?	Likert: 1 Not at all to 4 very supportive
Team support towards agile	How supportive is the project team of the adoption of agile methodologies?	Likert: 1 not at all to 4 very supportive

TABLE 4. Proposed Measures in Climate for Project Succes

RESULTS

Regression analysis was undertaken to measure the relationships between the independent and dependent variables noted in the previous section. Regression was chosen as it provides a well-established linear technique to assess multiple independent measures and determines the relative effect on these variables on a dependent measure.

--- Preliminary Tests ---

Before performing the analysis, the assumptions underlying regression were considered. Histograms of each variable showed no significant signs of non-normality and visual inspection of scatter plots showed no obvious non-linear

relationships between the variables identified for the analysis. A plot of the standardized residuals by the regression predicted value showed no indication of heteroscedasticity in either regression. Multicollinearity was assessed using the Variance Inflation factor (VIF) reported in the final column of T**ables 12** and **13.** A tolerance of less than 0.20 or a VIF levels over 5 suggests the presence of significant multicollinearity (Hair et al., 2006). Results show no significant effect of multicollinearity in either regression.

--- Regression Results ---

Two regression analyses were created. Both regressions used a General Least Squares linear procedure using unstandardized variables. The first (Regression 1) regressed the dependent variable of Stakeholder Success against the set of independent measures identified in **Table 4.** Results for Regression 1 are shown in T**able 5.** The second regression (Regression 2) regressed the dependent variable of Budget/Time Success against the same set of independent measures. Results for Regression 2 are shown in **Table 6**.

Regression 1 produced a model that provided a strong significant effect of the independent variables on Stakeholder Success (Adjusted R2=.346, F=23.62, p=.000). In considering the effects of individual variables, the impact of Top Management Support variables was strong with Senior Management Support (t=3.86, p=0.000) and Degree of Stakeholder Engagement (t=6.18, p=0.000) both positive and significant. The impact of the Sufficient Resources variables was smaller with only the Amount of Budget Flexibility (t= -2.79, p = 0.000) being significant, however the relationship was negative, suggesting that as budget flexibility increases, stakeholder success decreases. Finally, two of the Willingness to Adapt variables were positive and significant including Project team support of agile methods (t=2.19, p=0.029) and Team attitude towards change (t=3.99, p=0.000).

Regression 2 produced a model with a significant effect of the independent variables on Budget/Time Success (Adjusted R2=.154, p=.000). In considering the effects of individual variables, the impact of Top Management Support variables was strong with Senior Management Support (t=2.14, p=0.033) and Degree of Stakeholder Engagement (t=4.07, p=0.000) positive and significant. The impact of Sufficient Resources was smaller with only the Amount of budget flexibility (t=-4.73, p = 0.000) being significant but negative, suggesting that as budget flexibility increases, Budget/Time success decreases. Finally, none of the Willingness to Adapt variables were significant in explaining the Budget/Time success.

Table 7 summarizes the results for both regressions.

ANALYSIS

The regression analysis provides information about the linear relationships between the independent variables and the two dependent variables. The results summarized in **Table 7** indicate 3 variables with significant linear relationships with both Stakeholder

Dependent Variable: Stakeholder Success (R2 = 0.361, Adj. R2=0.346, F= 232.62, p = .000)	Unstandardized Coefficients		Std. Coeff.	t	Sig.	Collinearity Statistics
	B	Std. Error	Beta			VIF
(Constant)	0.15	0.055		2.739	0.006	
Senior Management support of the project	0.039	0.01	0.19	3.836	0.000	0.674
Degree of stakeholder engagement	0.063	0.01	0.32	6.184	0.000	0.631
Frequency of meetings with product owners or business sponsor	-0.009	0.011	-0.04	-0.876	0.382	0.787
Amount of budget flexibility	-0.023	0.008	-0.11	-2.785	0.006	0.951
Team Fully dedicated to project	0.003	0.01	0.01	0.283	0.777	0.685
Local vs. remote team	0.007	0.007	0.04	1.004	0.316	0.984
Upper management support of Agile methodologies	0.006	0.012	0.02	0.496	0.62	0.494
Project team support of Agile methodologies	0.027	0.012	0.13	2.194	0.029	0.48
Team attitude toward accepting changes	0.042	0.01	0.19	3.994	0.000	0.714

TABLE 0. Regression 1 Results, Dependent Measure – Stakeholder Success

Dependent Variable: Budget/Time Success (R^2 = 0.174, Adj. R^2=0.154, F= 8.778, p = .000)	Unstandardized Coefficients		Std. Coeff.	t	Sig.	Collinearity Statistics
	B	Std. Error	Beta			VIF
(Constant)	0.412	0.07		5.85	0.000	
Senior Management support of the project	0.028	0.013	0.12	2.14	0.033	1.484
Degree of stakeholder engagement	0.053	0.013	0.24	4.07	0.000	1.584
Frequency of meetings with product owners or business sponsor	-0.008	0.014	-0.02	-0.55	0.577	1.27
Amount of budget flexibility	-0.051	0.011	-0.22	-4.73	0.000	1.052
Team Fully dedicated to project	0.001	0.013	0.004	0.07	0.940	1.46
Colocation - Local vs. remote team	-0.007	0.008	-0.04	-0.84	0.396	1.016
Upper management support of Agile methods	0.021	0.016	0.09	1.34	0.179	2.022
Project team support of Agile methods	0.001	0.016	0.006	0.08	0.930	2.085
Team attitude toward accepting changes	0.015	0.013	0.062	1.12	0.262	1.402

TABLE 6. Regression 2 Results, Dependent Measure – Budget/Time Success

Variables	Regression 1 Stakeholder Success Adj. R2 =0.356	Regression 2 Budget/Time Success Adj. R2 =0.154
Top Management Support		
Senior Management support of the project	Significant Positive Effect	Significant Positive Effect
Degree of stakeholder engagement	Significant Positive Effect	Significant Positive Effect
Frequency of meetings	Not Significant	Not Significant
Sufficient resources		
Amount of budget flexibility	Significant Negative Effect	Significant Negative Effect
Team fully dedicated to project	Not Significant	Not Significant
Colocation - Local vs. remote team	Not Significant	Not Significant
Willingness to Adapt		
Upper management support of Agile methods	Not Significant	Not Significant
Project team support of Agile methods	Significant Positive Effect	Not Significant
Team attitude toward accepting changes	Significant Positive Effect	Not Significant

TABLE 7. Summary of Regression Results

Success and Budget/Time Success; 2 variables with significant linear relations with Stakeholder Success but not Budget/Time Success; and 4 variables with no significant linear relationship with either of the dependent variables.

Before concluding that the variables that did not play a significant role in the regressions were not associated with project success, we looked for effects that could be obscured by other variables in overall model. To do this, we used the analysis of variance (ANOVA) method which compares means for each category of response against the overall variance in the responses. Significant results suggest there are differences in the mean scores of the dependent variable across the response categories for each independent variable considered. In addition, this method can identify relations that are not fully linear but significant. Serrador and Turner (2015) identified that planning has a non-linear inverted U relationship with success.

The results for each of the 7 variables under consideration is provided in the following 7 tables followed by a short summary of the results.

--- Frequency of meetings with product owners or business sponsor ---

Although interaction between team members and sponsors is often suggested as a key factor in project success, the influence of this variable was not significant in either regression. However, results in **Table 8** for the ANOVA (p(F) = 0.002, 0.184 for Stakeholder Success and Budget/Time Success respectively) indicated a significant difference across response categories for Stakeholder Success. The mean scores for Stakeholder Success tend to increase as the frequency of meetings is increased (except for the first category – every 6 months). This is an expected result as more meetings likely indicates successful communication which may lead to success as viewed by project stakeholders. The fact that frequency of meetings did not impact Budget/Time Success might be related to the increased cost of frequent meetings or perhaps the changes to project scope that might be a result of these meetings.

--- Amount of Budget Flexibility ---

Earlier papers (Bogsnes, 2009) suggested that the level of budget flexibility should result in more successful projects. Budget flexibility, it is argued, allows the project team to adapt to changes and provide a more successful outcome. In the regressions, Budget Flexibility was significantly and negatively related to both Stakeholder Success and Budget/Time Success. Results indicated no significant effect for Stakeholder Success and a significant effect for Budget/Time Success. The mean scores for Budget/Time Success tend to decrease as the level of budget flexibility increases, suggesting that that increased budget flexibility decreases Budget/Time Success.

This is a new and interesting finding, but not counter-intuitive. If budgets are flexible, teams may be more likely to be less disciplined, resulting in budget overruns. Overall, there seems to be little benefit to budget flexibility for either project success measure.

--- Team Fully Dedicated to Project ---

It is often suggested that teams that are fully dedicated to projects

Frequency of meetings with product owners/sponsor	Means and ANOVA test results		
	Stakeholder Success	Budget/time Success	Valid N
1 – Every 6 mths	0.630	0.524	18
2 – Every 2 mths	0.595	0.615	26
3 – Monthly	0.650	0.636	98
4 – Weekly	0.718	0.653	247
5 – Daily	0.706	0.659	59
Mean/Mean/Total	0.691	0.642	448
p(F)	0.002	0.184	

TABLE 8. ANOVA – Project Success vs Frequency of meetings with product owners/sponsor

Amount of Budget Flexibility	Means and ANOVA test results		
	Stakeholder Success	Budget/time Success	Valid N
Very Low	0.691	0.692	52
Low	0.684	0.654	174
Medium	0.704	0.654	161
High	0.667	0.526	42
Very High	0.690	0.582	20
Mean/Mean/Total	0.691	0.643	449
p(F)	0.810	0.003	

TABLE 9. ANOVA – Project Success – Amount of Budget Flexibility

Team fully dedicated to project	Means and ANOVA test results		
	Stakeholder Success	Budget/time Success	Valid N
Very Low Dedication	0.631	0.676	13
Low Dedication	0.560	0.530	48
Medium Dedication	0.647	0.626	120
Highly Dedicated	0.731	0.661	183
Completely Dedicated	0.752	0.685	84
Mean/Mean/Total	0.691	0.642	448
p(F)	0.000	0.002	

TABLE 10. ANOVA – Project Success - Team Fully Dedicated to Project

Colocation - Local vs. Remote Team	Means and ANOVA test results		
	Stakeholder Success	Budget/time Success	Valid N
International	0.678	0.651	129
national	0.712	0.646	86
Same City	0.678	0.644	74
Same Office	0.694	0.634	157
Mean/Mean/Total	0.690	0.643	446
p(F)	0.586	0.930	

TABLE 11. ANOVA – Project Success – Colocation - Local vs. Remote Team

are associated with higher levels of success; however this variable did not contribute significantly to the regression results seen in **Table 5** and **6**. Results for the ANOVA (p = 0.000, 0.002 for Stakeholder Success and Budget/Time Success respectively) indicated a significant difference across response categories for both dependent variables. The mean scores for dependent variables also tend to increase as the team dedication to the project is increased, except for the first category – very low dedication, which has a small sample size. These results suggest that the more a team is dedicated to the project, the more success will be enjoyed.

--- Colocation - Local vs. Remote Team ---

It is often argued that teams that are co-located perform better and lead to increased project success and that colocation reduces communication and coordination costs and hence should have a positive impact on Budget/Time Success. Results for the

ANOVA (p= 0.586, 0.930 for Stakeholder Success and Budget/Time Success respectively) indicated no significant difference across response categories for the colocation variable. The mean scores for dependent variables also showed no significant pattern across the various levels of colocation. These results show that collocation is not significant for project success. This result, which calls into question the received wisdom about the value of co-location, might be explained as a result of the newer technologies that support team communication. Perhaps having a consistent rhythm of weekly or daily meetings supported by technology is just as important to help distributed teams to be more successful. This is a new and interesting finding.

--- Upper Management and Team Support of Agile Methodologies ---

Agile methods are designed to be adaptive to stakeholder feedback and we had hypothesized that support for agile methods, both from upper management and from the project team, would be positively influential with respect to both dimensions of project success. However, in the regressions, only Project Team support of Agile methods was significant with respect to Stakeholder Success. However, ANOVA tests of Upper Management Support (p= 0.000, 0.013) for Stakeholder Success and Budget/Time Success respectively) indicated a significant difference across response categories for both dependent variables. The mean scores for dependent variables tended to increase as the Upper Management Support of Agile Methodologies was increased. These results suggest both aspects of success are somewhat linked to Upper Management Support of Agile Methodologies. The sample size for this variable was smaller than the variables used previously, likely because some respondents were not using any agile methods and hence could not provide an answer to the question. The smaller sample size might be why the variable did not show significantly in the regression analysis even though the relationship appears to be significantly linear in the ANOVA results. In addition, the more general Senior Management Support for the project was the most significant variable in the regression, possibly hiding the influence of Upper Management Support of Agile Methods.

With respect to Team Support for Agile methods, it can again be argued that team willingness to accept change should lead to better response to stakeholders and hence better project success along both dimensions. Results for the ANOVA (p= 0.000) for Stakeholder Success and Budget/Time Success respectively) supported the earlier finding that as Team Support for Agile methods increases, so does Stakeholder Success. However, this variable was not significant for Budget/Time Success as Budget/Time Success did not increase as Team Support increased.

In hindsight, these results are somewhat explainable, in that when the project team is willing to accept changes as the project progresses, it is quite likely that the stakeholder, who may have initiated the changes, is satisfied. However, the original time/budget targets are unlikely to be attained. Hence the different results with respect to the two dimensions of project success.

--- Team Attitude Towards Accepting Changes ---

Changes often occur during projects and teams that have an attitude that accepts changes may have an advantage over other teams that don't respond as well to change. In the regressions, this variable did not have a significant relationship with Budget/Time Success. However, results for the ANOVA (p= 0.000, 0.000 for Stakeholder Success and Budget/Time Success respectively) indicated a significant difference across response categories for both measures of project success. The mean scores for dependent variables also tend to increase as the attitude toward accepting change is increased, except for the last two categories (High and Very High) which showed small differences.

These results suggest that both Stakeholder Success and Budget/Time Success are positively linked to the team's attitude towards accepting change. However, there is no performance difference among projects where the teams attitude towards accepting change is either High or Very High. As long as the attitude is at least High, the performance seems to improve. This suggests that it is not necessary to drive the attitude towards accepting change to a very high level to achieve success. Note, it is somewhat surprising that this is beneficial for the Time/Budget Success measure. It appears that flexibility to customer needs is important to all aspects of project success and is to be encouraged.

--- Combining ANOVA Results with Regression Results ---

In the **table 15,** we show both the regression and the ANOVA results to get a complete picture of the elements of each dimensions of Climate for Project Success that may influence project outcomes. ANOVAs were performed when variables failed to be significant in the regression, since there was a theoretical reason why they might be influential and it was possible that their impact was masked by the strong influence of the Senior Management Support and the Degree of Stakeholder Engagement variables.

In general, the ANOVA results provide further evidence of the relationship observed between the independent variables and the two measures of success. Given the exploratory nature of the study, the ANOVA analysis suggests that further work on the measures should be able to provide even higher levels of explanatory power.

CONCLUSIONS

Clearly, some of the dimensions of Climate for Project Success play a very strong part in both dimensions of project success, however there are differential effects.

All three variables within Dimension 1, Top Management Support, showed a very strong correlation with Stakeholder success. This is not surprising as the practitioner literature and the critical success factors literature (Poon et al, 2011; Johnson et al.2001) has long pointed to organizational and management support as key to project success. Frequency of Meetings variable was not

Upper Management Support of Agile Methodologies	Means and ANOVA test results		
	Stakeholder Success	Budget/time Success	Valid N
Not at all Supportive	0.610	0.583	54
Mostly not Supportive	0.643	0.611	86
Somewhat Supportive	0.710	0.655	175
Very Supportive	0.762	0.698	78
Mean/Mean/Total	0.692	0.644	393
p(F)	0.000	0.013	

TABLE 12. ANOVA – Project Success – Upper Management Support of Agile Methodologies

Team Support of Agile Methodologies	Means and ANOVA test results		
	Stakeholder Success	Budget/time Success	Valid N
Not at all Supportive	0.622	0.628	42
Mostly not Supportive	0.617	0.592	59
Somewhat Supportive	0.680	0.638	159
Very Supportive	0.761	0.679	133
Mean/Mean/Total	0.692	0.644	393
p(F)	0.000	0.075	

TABLE 13. ANOVA – Project Success – Team Support for Agile Methodologies

Team attitude toward accepting changes	Means and ANOVA test results		
	Stakeholder Success	Budget/time Success	Valid N
Very Low	0.433	0.550	10
Low	0.553	0.566	63
Medium	0.670	0.617	176
High	0.766	0.694	150
Very High	0.768	0.698	48
Mean/Mean/Total	0.691	0.643	447
p(F)	0.000	0.000	

TABLE 14. ANOVA – Project Success vs Team Attitude Towards Accepting Change

+ denotes significant positive impact on the project success dimension;
- indicates a significant negative impact
Not sig indicates no significant relationship found
Blank indicates no test was required due to nature of initial analysis

	Stakeholder Success		Budget/Time Success	
Dimensions/Variables	Regression	ANOVA	Regression	ANOVA
Top Management Support				
Senior Management support of the project	+		+	
Degree of stakeholder engagement	+		+	
Frequency of meetings	not sig.	+	not sig.	not sig.
Sufficient resources				
Amount of budget flexibility	-	not sig.	-	-
Team fully dedicated to project	not sig.	+	not sig.	+
Colocation - Local vs. remote team	not sig.	not sig.	not sig.	not sig.
Willingness to Adapt				
Upper management support of Agile methods	not sig.	+	not sig.	+
Project team support of Agile methods	+	+	not sig.	+
Team attitude toward accepting changes	+	+	not sig.	+

TABLE 15. Integrated Regression and ANOVA Results

influential with respect to Budget/Time Success. We suggest two potential explanations for this result, first - there may be types of projects, possibly those with established methods and clear goals, that do not benefit from increasing the amount of interaction with stakeholders. Second - meetings with stakeholders may result in changes to the scope of projects, leading it to missed budget/time goals.

We can see how an organization must support a project if we review the components of this factor:

- Degree of Stakeholder Engagement – If an organization supports high stakeholder engagement and allocates time for stakeholders to participate in projects, this is clearly beneficial to project success.

- Senior Management Support – This has always been thought of as important. Senior management can ensure proper resources are allocated to a project and can help in removing obstacles to project success.

- Frequency of Meetings – this variable was influential with respect to Stakeholder Success but not to Budget/Time Success. The takeaway here is that meetings which either consume resources or add scope may negatively impact these targets.

Variables within dimension 2, Sufficient Resources, were less successful in influencing project success. In fact, Budget Flexibility was seen to be a negative influence and colocation of team members showed no impact. Only Team Fully Dedicated was influential, to both Stakeholder Success and Budget/Time Success. The two non-results are interesting. They suggest that sponsors hold the line with respect to budget goals to improve the chances of project success. They also suggest that teams that are co-located do not outperform teams that are dispersed. Sponsors should use available budget to create the technology and cultural support for dispersed teams rather than try to force co-location.

Variables within dimension 3, Willingness to Adapt, were uniformly positively related to both dimensions of project success, with the exception that that Project Team Support of Agile Methods did not impact Budget/Time Success.

--- Guidance for Practitioners ---

There are a set of practices and behaviours that sponsors and senior stakeholders can develop to contribute to a climate for project success. These include demonstrating support and being fully engaged with the project at critical times such as charter signoff and scope change requests. They should also support the dedication of key members of the team to the project, rather than expecting success if core resources are actively engaged in multiple initiatives. However, making budgets flexible is not a recommended practice. Interestingly, managers may not want to put resources aside to ensure that team members are co-located. New technologies and distributed team management practices are making time and distance less important project success factors.

An interesting finding in this study is the influence of agile approaches. Our findings suggest that both management and team support for agile methods, which we interpret as shorter time between deliverables and a willingness to embrace change, can positively impact the stakeholder view of success as well as the more formal budget/time success.

--- Limitations of the Research ---

Ensuring adequate participation in surveys has become progressively more difficult in recent years (Denscombe 2007) as the number of research projects being conducted increases. Many organizations no long support distribution of survey requests to their members. Therefore, keeping surveys to a reasonable length helps to ensure a maximum rate of completion for those who do agree to take part. Examining all potential aspects of Climate for Project Success was not possible in this single survey.

A potential does exist for a circular relation in the perception of project climate and success. Manager may look back on a project and, remembering it was successful, may report that it had a favourable project climate elements. With a single informant, we relied on high quality informants, and good survey design techniques to elicit reliable data. One encouraging result was that respondents clearly differentiated multiple aspects of project success and did not exhibit a "halo" effect.

--- Guidance for Researchers ---

This study explored the potential of a new construct within project management theory –Climate for Project Success. We used both theory and variables that were available to us to test this concept. Overall, the three dimensions of the Climate construct explained over 35% of variance in stakeholder views of project success. Two out of the three dimensions look promising, but the Sufficient Resources dimension needs further development.

Predicting variance in budget/time success with Climate variables resulted in a credible but smaller r-squared of 15%, which suggests that other dimensions might be a useful addition. In place of Sufficient Resources, it might be theoretically sound to develop a Disciplined PM Practices dimension, which might include adherence to chosen methods, regular time and status reporting, and consistent change control. It is intuitive to suggest that there will be different factors influencing the ability of a project to conclude on time and on budget with factors that will result in stakeholders being delighted. These two measures of project success are correlated (at the .580 level in this study), but they are not the same.

The elements of our Climate factor have been written about in the practitioner literature for many years. However, this study confirms their importance through a quantitative analysis. Projects represent trillions of dollars of global expenditures annually. It is important that organizations develop project Climates that deliver good results.

In future, there might be some value in digging deeper into project characteristics and ask whether the criticality of the project or the project type may influence Climate dimensions and project success.

ACKNOWLEDGEMENTS

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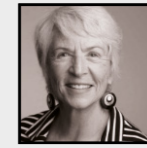
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