

Can creativity make a difference? Leveraging the creative work environment to impact performance in annual revenues of architectural firms

Katharine E. Leigh¹, Kenneth R. Tremblay, Jr.¹, Amy M. Huber²

¹Department of Design and Merchandising, Colorado State University, Fort Collins, Colorado, USA

²Department of Interior Design, Florida State University, Tallahassee, Florida, USA

Email address:

katharine.leigh@colostate.edu (K. E. Leigh), kenneth.r.tremblay@colostate.edu (K. R. Tremblay),
amattinglyhuber@fsu.edu (A. M. Huber)

To cite this article:

Katharine E. Leigh, Kenneth R. Tremblay, Jr., Amy M. Huber. Can Creativity Make a Difference? Leveraging the Creative Work Environment to Impact Performance in Annual Revenues of Architectural Firms. *International Journal of Economic Behavior and Organization*. Vol. 2, No. 4, 2014, pp. 58-68. doi: 10.11648/j.ijebbo.20140204.12

Abstract: Creativity remains an elusive, intangible contributor to workplace performance despite emphases from psychoeconomic approaches. Few empirical studies investigate creativity's influence on organizational performance in a manner applied to practice or have differentiated creative versus non-creative domains. It has also been proposed that organizations have yet to establish management frameworks maximizing their creative capital. This study examines responses to an e-survey from staff of five top ranked U.S. architectural practices (N = 90). Study findings identify potential differences between creative versus non-creative domains, factors impacting creativity in the workplace, and the relationship between organizational creativity and annual revenues.

Keywords: Organizational Creativity, Workplace Performance, Values

1. Introduction

Attention to creativity has experienced spurts of activity after post-war years as the U.S. focused on expanding and accelerating its role as a world leader and as pace of change in the economy accelerated. Basadur and Gelade [10, p. 45] suggested organizations need to improve performance to capitalize on rapid change in order to establish or regain their competitive edge. "Creativity in synthesizing complex information becomes more essential as rapidly changing organizational life requires individuals to tolerate ambiguity, instead of perpetuating conservative decision-making" [Krantz, as cited in 60]. Since Guilford's acceptance speech to the American Psychological Association in 1950, creativity research has moved from a focus on individual views of creativity encompassing measurement of personality factors as a psychometric approach [34, 38, 54] to a systems view of creativity emphasizing the interaction of the individual with the environment [21, 31, 32, 33]. More recently, creativity has embraced cognitive views of creativity examining thinking processes [3, 7, 44] and the value of creative performance from an economic perspective

[17, 49, 52, 53].

Organizational levels of creativity [2, 18] have been examined focusing on influences of climate factors in the work environment [4, 36] to confirm the extent and consistency of factors contributing to creativity in non-design organizations. These studies are not without contradiction to their findings. Factor relationships have been challenged, for example, in the instrumentation structure of Amabile's KEYS [9, 27, 48]. Construct comprehension and clarity surrounding time pressures and freedom have been questioned; in addition, work processes have been significantly influenced by new technologies, information networks, and the presence of a multigenerational workforce. And, a single definition of creativity has not been universally adopted by the research community, differing by researcher, discipline orientation, and time frame [5, 19, 47].

Williams and Yang [60, p. 389] examined the concept of *organizational creativity* as an adaptive entity "highlight[ing] the need for...[greater] employee autonomy, intrinsic motivation and commitment," not just individual creativity in a group work setting. Studying creativity within complex

social settings, group creativity has been depicted as a function of an individual's group, influenced by group composition (diversity), group characteristics (cohesiveness, size), group processes (problem-solving strategies, social information processing), and contextual influences stemming from the organization [60]. The creative organization encompasses factors surrounding removal of barriers demonstrating managed innovation, idea evaluation procedures, motivational stimuli, communication procedures, development of idea sources, and evidence of the creative planning process [40]. By examining group creativity on an organizational level, individual idiosyncrasies are eliminated and the focus is directed toward factors affecting the group as a whole; useful when examining organizational characteristics such as performance.

Research studies rooted in psychoeconomic theory [17, 49, 52, 61] have shown conceptual promise in terms of economic performance measures related to creativity [50]; however, research in this area has not generated information useful to practitioners. While creativity continues to serve as a mantra for organizations competing in the global economy, Florida and Goodnight [31, p.125] proposed: "...businesses have been unable to pull ...notions of creativity together into a coherent management framework despite their assertion that "a company's most important asset isn't raw materials, transportation systems, or political influence...it's creative capital - an arsenal of creative thinkers whose ideas can be turned into valuable products and services."

1.1. Purpose

An indirect relationship between business excellence (performance) and organizational innovation (organizational creativity) was indicated in the findings of a study by Eskildsen, Dahlgaard, and Nørgaard [28] suggesting organizational creativity's inability to directly impact organizational excellence and was mediated by organizational learning. This research examines factors found to be significant in the creativity literature focused on the workplace to examine the relationships between creativity and performance in architectural practice as a creative professional domain. Creativity and innovation characterize the architectural work environment [11, 12, 22, 46] and the products of architectural services (i.e., generating new and creative ideas through their work) [47]. Is creativity capable of making a difference with regard to firm performance? If we assume that creativity does have an impact and in light of the Architectural Billing Index (ABI) reaching historic lows, can practitioners leverage creativity to maximize performance?

2. Conceptual Framework

The conceptual framework for the study (Fig. 1) initially considered factors reported in the literature to impact organizational creativity; disciplines including the social sciences, human resource development, industrial design,

and technology have each examined specific factor structures. Creativity measures developed in this study include individuals' *self-evaluation of creativity* (Cs), and composite indices for *creativity as a component of the job or firm function* (Cf) and creativity as represented by factors of the *creative work environment* (CWE). Value measures focused on individual *job satisfaction* (Js), and composite indices constructed for *job interdependence* (Ji), *workplace values* (Wv) and value discipline models [55] for *product leadership* (PL), *customer intimacy* (CI), and *operational excellence* (OE).

2.1. Factor Selection and Consistency

Two consistent and major challenges to factor identification were inconsistent terminology and inconsistency of statistics and validation measures across various studies. Hunter et al.'s [36] meta-analysis provided one source for contextual comparison of factors by comparing effect sizes [16] using Cohen's delta to calculate each factor's effect size across 42 studies. Factors producing large effect sizes were of central concern in this study's factor selection and resulted in the inclusion of the three most significant factors:

positive interpersonal exchange ($\Delta = .91$, $SE = .39$)

intellectual stimulation ($\Delta = .88$, $SE = .18$)

challenge ($\Delta = .85$, $SE = .14$)

Support for creativity from management, supervisors, and peers was also deemed important in varied studies as well as top management support for creativity ($\Delta = .75$, $SE = .10$).

Factors producing small effect sizes included:

autonomy (freedom) with the smallest effect size ($\Delta = .48$, $SE = .09$)

resources ($\Delta = .51$, $SE = .19$)

reward orientation ($\Delta = .55$, $SE = .14$)

These findings contrasted statistically with Amabile's et al. [5] findings which suggested *autonomy and freedom*, and *resources* promoted creativity [4, 5, 13, 23, 24, 25, 26, 36, 39, 41, 58]. *Threats or impediments* to creativity (workload pressure, work not perceived to be challenging, and organizational impediments such as rigid or controlling management structures) have been alternately suggested as negating the role and presence of creativity [5]. Pressures in organizations may have shifted over the past 10 years, further impacting the influence of these factors. Flexibility and risk-taking ($\Delta = .78$) were excluded from this study assuming these factors in a creative work environment would be inherent in the workplaces of creative domains and specifically within the realm of architectural practice.

Empirical findings were, then, considered in the final selection of factors to be included in the study (Fig. 1) as follows:

- creativity
- self-evaluation
- creativity of the job/firm
- creative work environment
- values
- job satisfaction

- job interdependence
- workplace values
- value discipline

- performance
- annual revenue tier

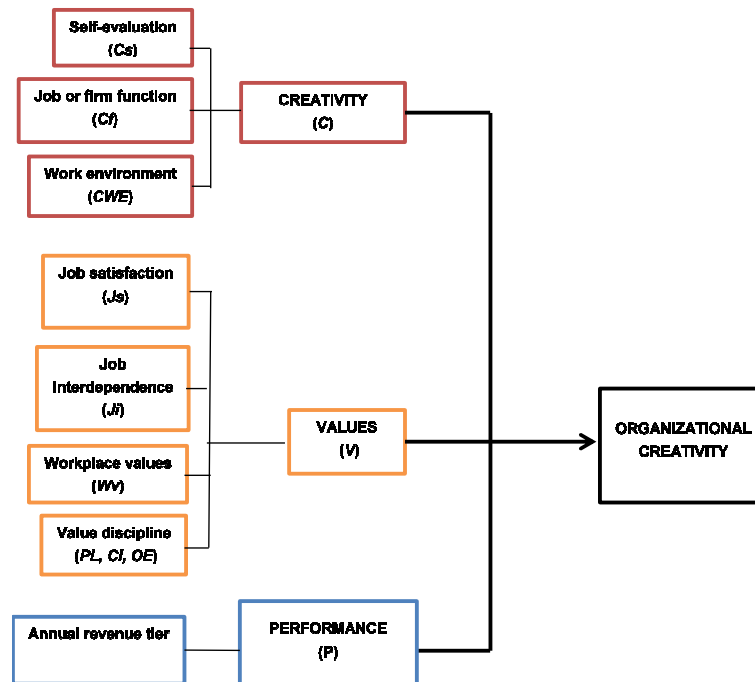


Figure 1. Conceptual framework with key factors related to organizational creativity

2.2. Research Questions

The research design was guided by three research questions:

RQ1: What is organizational creativity in architectural practice?

RQ2: Is there a relationship between creativity and performance in architectural practice?

RQ3: How well does a combination of values and performance predict creativity in architectural practice?

3. Methodology

Thirty firms were drawn from a stratified random sample of Architectural Record's 2009 Top 250 Firms reporting annual revenues from architectural services only; 109 firms were invited to respond to an e-survey. From the 109 firms, three tiers were constructed with an equal distribution of firms in each tier; the architecture revenue ranges were:

- TIER 1: \$32.00 to 549.95 million
- TIER 2: \$18.00 to 31.90 million
- TIER 3: \$4.65 to 17.90 million

Although 15 firms provided an appropriate sampling size, selected based on total potential population using a sampling table [43], the number of firms was doubled when issues in the economy potentially impacting architectural services were considered (i.e., the Architectural Billing Index reached record lows). Firms in each tier were treated as a group, representing a variant on cluster sampling. Geographic distribution of the sample was examined and

representative of the geographic distribution of the 109 firms from the top 250 list. Consistency in practice focus and work tasks found in large scale urban practice was assumed given locations in major urban metroplexes.

Three firms declined to participate at the beginning of the research, citing economic challenges; eight firms immediately agreed to participate (29% response rate). Data were collected from 90 participants of five firms during 2009-2010; with three firms failing to access the survey during the scheduled survey release. The e-survey contained questions about respondent backgrounds and the constructs of creativity, values, and performance. Firm principals served as gatekeepers in distributing the survey access site invitations to staff and were requested to send two reminders to employees a week apart after the initial two weeks.

3.1. Measures

All data were based on self-report questionnaires provided electronically. The survey included three main sections: Part 1 included demographic measures; Part 2 included ratings of agreement for the three value disciplines (9 items); and Part 3 included ratings of agreement for work environment and value factors included in the study (15 items).

Self-evaluation of creativity (*Cs*)

Self-evaluation of creativity of the respondent was measured on a 3-point scale ranging from extremely, moderately, and a little, with a choice of not at all.

Creativity of the job/firm (*Cf*)

A measure for creativity was included in Amabile et al.'s [5, 6] model within the measures for the creative work environment. A similar measure was used to represent creativity of the organization in this study and measured using a 5-point Likert scale focused on the extent to which creativity is an integral component of the job or firm, ranging from strongly agree to strongly disagree.

Creativity of work environment (*CWE*)

Creativity of the work environment was measured by 11 factors including *Cf* with five items each and measured using a 5-point Likert scale, ranging from strongly agree to strongly disagree:

- Organizational encouragement (*Oe*)
- Intellectual stimulation (*Is*)
- Leader support and feedback (*LS*)
- Positive interpersonal exchange (*Pi*)
- Sufficient resources (*R*)
- Freedom (*F*)
- Challenging work (*Cw*)
- Workload demands (*Wd*)
- Organizational roadblocks (*Or*)
- Productivity (*P*)
- Creativity (*Cf*)

Measures for *leader support and feedback*, *positive interpersonal exchange*, *freedom*, and *workload demands* were adapted from an instrument developed by Haynes, Wall, Bolden, Strike, & Rick [35] with permission of the authors. Measures for *organizational encouragement*, *intellectual stimulation*, *sufficient resources*, *challenging work*, *organizational roadblocks*, *creativity*, and *productivity* were developed by the senior researcher after review and synthesis of items used in previous research studies [5, 6, 8, 23, 24].

Job satisfaction (*Js*)

Job satisfaction of the respondent was measured on a 3-point scale ranging from extremely, moderately, and a little, with a choice of not at all.

Job interdependence (*Ji*)

A published instrument [29] was adapted with permission for *job interdependence* [Dean & Snell, as cited in 29, pp. 101-102] and measured with 5 items using a 5-point Likert scale, ranging from strongly agree to strongly disagree.

Workplace values (*Wv*)

A published instrument [29] was adapted with permission for *workplace values* [Van Dyne, Graham, & Dienesch, as cited in 29, p. 284] and measured with 10 items using a 5-point Likert scale, ranging from strongly agree to strongly disagree.

Value disciplines (*Cs*)

Measures for value disciplines (*PL*, *CI*, and *OE*) were developed by the senior researcher based on an examination and understanding of components of the value discipline characteristics for market leadership outlined by Treacy and Wiersema [55, pp. 52,90,130] to test their relationship to creativity. Three statements were attributed to each value discipline and measured using a 5-point Likert scale, ranging

from strongly agree to strongly disagree.

3.2. Analysis

From a postpositivistic perspective [20], the study collected empirical data to expand a theoretical understanding of factor relationships. Exploratory factor analysis (EFA) examined construct integrity and internal reliability in constructing indices [1] and principal axis factor analysis (PA) with varimax rotation assessed underlying factor structures.

Pearson chi-square was calculated to determine statistically significant relationships in evaluating effect size. For *annual revenue tier*, Kendall's tau-b was used to measure strength of the association; if the association was statistically significant $p < .001$, *tau* would be interpreted in a similar manner to *r* as a large effect size. For correlations and regression computations, Pearson product moment (bivariate Pearson) correlation and Spearman *rho* (for ordinal variables) were calculated. In simultaneous multiple regression computations, the adjusted R^2 value was also examined. One-sample *t* tests and independent sample *t* tests were also calculated using the Mann-Whitney U (nonparametric) test for the latter and calculating the effect size for *d*. Finally, one-way ANOVAs, single factor analysis and MANOVAs, and multi-factor analysis were used to compare groups followed by post hoc Tukey HSD Tests to identify specific differences.

Cronbach's alphas were calculated to examine reliabilities for the summated scores (indices) representing creativity (*Cf*); for each of the items comprising the creative work environment (*CWE*); for workplace values (*Wv*), job interdependence (*Ji*); and indices for the three value disciplines, *PL*, *CI*, and *OE*. For a five item Likert scale, $\alpha \geq .70$ was acceptable [42]; for the value discipline indices, slightly lower alphas were acceptable. For published scales where Cronbach's alphas were given, comparison was made with the adapted scale. High correlations from regression models were evaluated and steps taken to eliminate multicollinearity by combining variables or eliminating one or more variables from the regression model.

4. Results

Three firms participated from Tier 2 and two from Tier 3; firms from Tier 1 did not participate in the study. Respondents encompassed design and non-design positions, typical of larger architectural practices located in urban areas in the west, mid-west, and eastern U.S. An overwhelming majority identified themselves as creative (92%), and identified annual salaries commensurate with their positions. Twenty-two respondents earned an annual income over \$105,000 (26%). The most frequently reported salary range was \$45,001-\$65,000, similar to the average salary range reported by the Bureau of Labor Statistics [14]. Two-thirds of respondents were male with females in these firms holding positions approximating percentages reported

by the American Institute of Architects for executive levels with increasing percentages of participation as they noted higher positions in the firm, similar to that of male counterparts in the same positions. Females exhibited a slightly higher representation as positions advanced to executive levels, atypical of the career path in architecture for women. Over half of participants held architectural degrees with a few holding international architectural credentials (education or professional organizations). More than half of respondents had experience in the corporate/commercial, education, residential, and retail market segments and over 48% had been in practice more than 15 years with nearly 21% in practice over 25 years.

4.1. Creativity in Practice

Three creativity measures were used in the study encompassing a) employee self-reports of how creative they perceived themselves (*Cs*), b) measures of creativity intended to construct a composite index of job or firm creativity (*Cf*), and c) factors comprising the creative work environment (*CWE*).

Self-evaluation of creativity (*Cs*). Participants rated their level of creativity high (*Cs*) with over 92% of design and non-design respondents rating themselves moderately to extremely creative, confirming a widely held perception of the creative character of those in this professional domain ($M = 1.63$; $SD = .66$ using a 5-point Likert scale). The sample mean was compared to a hypothetical population mean calculating a one-sample *t*-test. When the value was set at 2 (agree), suggesting most architects would consider themselves creative, $p = .001$, the sample mean (1.63) did not differ from the population mean, suggesting respondents evaluated themselves as more or less equally as creative as their peers in practice. This also suggested statistically,

participants were not influenced by knowledge of the study's focus on creativity based on statistical similarity to a reasonable population mean.

Creativity of the job/firm (*Cf*). The second measure of creativity examined the extent to which creativity was perceived as an integral part of the function of the job or firm. Creativity (*Cf*) was perceived as an integral component of the job or firm. Table 1 shows all pairs of items significantly correlated, with a statistically significant relationship to one another. The mean score for combined items for *Cf* was 2.28 ($SD = .64$; $N = 78$); and 1.63 ($SD = .67$) when non-design staff ($N = 75$) were excluded. Cronbach's alpha was computed, with design versus non-design staff combined. An unstandardized alpha of .88 resulted, above the threshold established for reliability ($\alpha \geq .70$) and acceptable for a five item scale.

To examine whether *Cf* differed across firms, means of each firm's *Cf* index were compared calculating one-way ANOVA with no statistical difference found across firms. Although a relationship might be assumed between how creative respondents considered themselves and the extent to which they perceived creativity as an integral part of their job in the firm, a correlation between self-evaluation of creativity (*Cs*) and creativity of the job/firm (*Cf*) index was not statistically significant, $r_s(76) = .04$, $p = .697$. The lack of correlation between how creative an individual rated oneself and perceptions of creativity as a part of job or firm invited continued inquiry.

Creative work environment (*CWE*). The third measure of creativity assessed the creative work environment using an index of 11 factors (Table 2) similar to and found significant in prior climate studies of work environments [2, 4, 6, 23, 35, 36, 40].

Table 1. Intercorrelations, means, and standard deviations for creativity of the job/firm (*Ff*) variable ($N = 78$)

Item	Item 1	Item 2	Item 3	Item 4	Item 5	<i>M</i>	<i>SD</i>
Item 1: This firm produces innovative projects	--	.70**	.63**	.47**	.60**	2.16	.84
Item 2: Project tasks call for people to be creative	--	--	.69**	.48**	.58**	2.13	.71
Item 3: People are encouraged to be creative in this firm	--	--	--	.58**	.67**	2.02	.70
Item 5: People are encouraged to take risks in this firm	--	--	--	--	.63**	2.73	.83
Item 5: Overall the current work in this firm is conducive to personal creativity	--	--	--	--	--	2.34	.80

** $p = .001$

Table 2. Intercorrelations, means, and standard deviations for creative work environment (*CWE*) composite variable ($N = 70$)

Index	<i>Oe</i>	<i>Is</i>	<i>Ls</i>	<i>Pi</i>	<i>Sr</i>	<i>F</i>	<i>Cw</i>	<i>Wd</i>	<i>Or</i>	<i>Cf</i>	<i>P</i>	<i>M</i>	<i>SD</i>
<i>Oe</i>	--	.64**	.58**	.45**	.32**	.20	.48**	-.23	-.61**	.58**	.21	2.56	.69
<i>Is</i>	--	--	.56**	.43**	.38**	.22	.54**	-.20	-.58**	.70**	.31**	2.41	.71
<i>Ls</i>	--	--	--	.41**	.29*	-.08	.43**	-.36**	-.40**	.57**	.21	2.28	.64
<i>Pi</i>	--	--	--	--	.32**	.19	.48**	-.14	-.49**	.42**	.28*	2.32	.36
<i>Sr</i>	--	--	--	--	--	.28*	.45**	-.25*	-.38**	.40**	.26*	2.34	.53
<i>F</i>	--	--	--	--	--	--	.25*	.11	-.22	.36**	.09	2.42	.38
<i>Cw</i>	--	--	--	--	--	--	--	.02	-.35**	.67**	.35**	1.97	.53
<i>Wd</i>	--	--	--	--	--	--	--	--	.32**	-.06	-.09	2.47	.47
<i>Or</i>	--	--	--	--	--	--	--	--	--	-.52**	-.06	3.22	.55
<i>Cf</i>	--	--	--	--	--	--	--	--	--	--	.34**	2.23	.65
<i>P</i>	--	--	--	--	--	--	--	--	--	--	--	2.68	.41

** $p < .01$; * $p < .05$

4.2. Revised Indices: CWER and Cfr

Principal axis factor analysis (PA) with varimax rotation suggested new combinations of items influencing items used to construct indices. Five indices comprise the revised creative work environment index (CWER) with 28 items:

- Creativity of the job or firm
- Organizational encouragement
- Leadership support and feedback
- Intellectual stimulation
- Challenging work

Cronbach's alpha for the revised composite index was higher than the original index; CWER = .87 compared to $\alpha = .70$, demonstrating increased reliability. In Hunter et al.'s [36] meta-analysis, *positive interpersonal exchange*, *intellectual stimulation*, *challenge*, and *organizational encouragement* were found to have significant effect sizes and *autonomy*, *resources*, and *reward* small or negligible effect sizes. The changing context of the workplace during an economic crunch may mean in creative work environments such as architectural practice, *freedom*, *positive interpersonal exchange*, *workload demand*, and *organizational roadblocks* may be conceptualized differently.

The creativity index (Cfr) was intended to capture the extent to which creativity was perceived as part of the job function or firm encouraging ideas, debate, and discussion of meaningful and demanding work executed effectively and efficiently. Chronbach's alpha increased from .88 to .92 when all 16 items were included based upon factor loading during the analysis of CWER. Since the increase in Cronbach's alpha was minimal (.04), the decision was made to: a) keep the original intellectual stimulation index ($\alpha = .83$) and challenging work index ($\alpha = .80$) intact in subsequent analyses (four items each for intellectual stimulation (*Is*) and challenging work (*Cw*) were incorporated in the factor loading indexing Cfr); b) use each of the five original items for Cfr; and c) include one item each that loaded on the first factor (organizational excellence item 1, and productivity items 1 and 5). The revised creativity of the job or firm (Cfr) index included eight items: *CI-5*, *Oe 1* and *P 1*, *P5* with a resulting Cronbach's alpha of .89.

4.3. Combined Creativity Index

Cs, Cfr, and CWER were conceptualized to represent dimensions of creativity in architectural practice, to consider person, process, and environment. Cronbach's alpha for a combined index was .54; therefore, not reliable.

4.4. Firm Differences
An assumption that architectural practices are similarly creative was tested by computing a one-way ANOVA examining variance of means for four firms in the study. A statistically significant difference was found among the firms on creative work environment (CWER), $F(3, 69) = 2.89$, $p = .042$. The mean value for CWER is 1.97 in firm A, 2.17 in firm B, 2.35 in firm C, and 2.43 in firm D (Table 3). The

results of the post hoc Tukey HSD Test indicated firm D differed from firms A, B, and C on CWER ($p < .05$, $d = .87$); with a smaller than typical effect size, $R^2 = .16$, suggesting some firms may reflect more creative work environments than others in practice (Table 4).

Table 3. Means and standard deviations comparing creativity measures for four firms for creative work environment (CWER) and predictor variables ($N = 73$)

Firms	Cs		Cfr		CWER	
	M	SD	M	SD	M	SD
A	1.63	62	2.29	57	2.35	48
B	1.59	62	2.25	33	2.17	27
C	1.74	72	2.49	66	2.43	55
D	1.47	62	2.03	51	1.97	47
Total	1.63	66	2.33	59	2.30	51

Table 4. One-way analysis of variance summary table comparing four firms on Cs, Cfr, and CWER

Source	df	SS	MS	F	p
Cs					
Between groups	4	1.29	.32	.72	.58
Within groups	84	37.47	.44		
Total	88	38.76			
Cfr					
Between groups	3	2.24	.75	2.22	.09
Within groups	71	23.88	.33		
Total	74	26.13			
CWER					
Between groups	3	2.12	.71	2.89	.04
Within groups	69	16.93	.24		
Total	72	19.06			

4.4. Value Discipline

A strong association with the product leadership value proposition was anticipated to theoretically support choice of a market leadership discipline [55] for firms' valuing creativity and innovation to a greater degree than the value disciplines for operational excellence and customer intimacy. PL appeared a good fit for respondents identifying with the extent to which creativity is part of the job or firm (Cfr). This finding is consistent with a value model embracing innovation as a characteristic of the organization's management system and culture.

4.5. Performance: Annual Revenue Tier

Tier 2 participants significantly differed from Tier 3 on years with firm ($p = .005$), in an independent samples *t*-test. Effect size, d , was approximately .30 for years with firm, slightly larger than a small effect size. Individuals in Tier 3 had been with their firms longer. On the remaining demographic variables, no significant differences were found by tier.

Embedded in this study was the question of difference by tier across three measures for creativity. The strongest correlation with tier, considered a very large effect, was with CWER, $r_s(71) = .85$, $p < .001$. ANOVAs indicated two creativity variables, CWER and Cfr; when examined alone,

were significantly different for tier, $F(1, 71) = 5.26, p = .025$, and $F(1, 71) = 7.62, p = .007$, respectively; with medium to large effect sizes.

The relationship between performance and creativity was examined by analyzing annual revenue tier in relation to the creativity variables. No association was found between tier and creativity self-evaluation (Cs); however, participants from Tier 3 scored significantly different on the creativity measures of Cfr and $CWER$ than participants in Tier 2 (Table 4), suggesting that Tier 2 respondents rated their perceptions of the work environment and how creative they perceived the job or firm higher; the more creative the firm, the higher the revenue.

4.6. Predicting Performance in Practice

Multiple regression was conducted to determine the best linear combination of value and creativity measures for predicting performance. Variable transformations were conducted to correct multicollinearity with tolerances low for all variables (with the exception of Cs ($R^2 = .122$)).

- $CWER$ was included without Cfr
- Workplace values (Wv) were deleted and replaced with combined items:
 - $Wv1 + Wv4 = Wv11$
 - $Wv5 + Wv3 + Wv2 = Wv12$
 - $Wv7 = Wv6 + Wv8 = Wv13$
 - $Wv9$
 - $Wv10$
- $Wv11$ and $Wv13$ were eliminated ($R^2 = .287, p = .021$)
- PL was deleted and replaced by $PL2$ and $PL3$

This combination of items significantly predicted tier

ranking, $F(10, 64) = 2.89, p = .005$; $CWER$ (w/out Cfr) and $Wv12$ significantly contributed to the prediction. The adjusted R^2 value = .20; 20% of the variance in tier ranking could be explained by this model with a small effect size [16]. Beta weights show *job satisfaction* contributed most to tier ranking; the greater the satisfaction, the higher the tier ranking.

4.7. Predicting Creativity in Architectural Practice

Eight indices describing the creative work environment ($CWER$) were found to be significantly associated with creativity in architectural practice resulting from the regression equation. These measures included *creativity of the job or firm* (Cfr), *organizational encouragement* (Oe), *leadership support and feedback* (Ls), *intellectual stimulation* (Is), *challenging work* (Cw), *the product leadership value discipline* (PL), *workplace values* (Wv), and *job satisfaction* (Js). Correcting for multicollinearity, *leadership support and feedback* (Ls) and *organizational encouragement* (Oe) were eliminated, and *product leadership* (PL) and *workplace values* (Wv) combined (Table 5). This combination of variables significantly predicted Cfr , $F(6, 65) = 35.81, p < .001$ with all variables except *self-evaluation of creativity* (Cs) contributing significantly to the prediction with an adjusted $R^2 = .74$; this is a much larger than typical effect size. The beta weights, presented in Table 6, suggest intellectual stimulation (Is) and $PL + Wv$ contribute most to predicting Cfr ; with challenging work (Cw) contributing to a lesser extent. Fig. 2 displays a model for creativity in architectural practice.

Table 5. Means, standard deviations, and intercorrelations for creativity of the job or firm (Cfr) and predictor variables ($N = 71$)

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
<i>Cfr</i>	2.32	.60	-.05	.76**	.67**	.58**	.29**	.80**
Predictor Variable								
1. Self-evaluation	1.60	.57	--	.13	-.11	-.07	.08	.12
2. Intellectual stimulation	2.60	.70		--	.54**	.49**	.20**	.73**
3. Challenging work	1.97	.52			--	.43**	.14	.61**
4. Job satisfaction	1.63	.61				--	-.04	.59**
5. Tier	1.71	.46					--	.29**
6. $PL + Wv$	2.52	.53						--

** $p < .01$; * $p < .05$

Table 6. Simultaneous multiple regression analysis summary for Cs , Is , Cw , Js , Tier, and $PL + Wv$ predicting creativity of the job or firm (Cfr) ($N = 71$)

Variables	<i>B</i>	<i>SEB</i>	β
Self-evaluation (Cs)	-.12	.06	-.12
Intellectual stimulation (Is)	.28	.08	.33**
Challenging work (Cw)	.22	.09	.19*
Job satisfaction (Js)	.12	.08	.12
Tier	.14	.08	.11
$PL + Wv$.40	.12	.35**
Constant	-.02	.22	

Note: $R^2 = .74$; $F(6, 65) = 35.81, p < .001$; ** $p < .01$; * $p < .055$. Discussion and Conclusion

This study sheds light on factors for consideration by design management regarding the leveraging capabilities of organizational creativity to impact annual revenue as a measure of performance (Fig. 2). Creativity was found to have a direct yet fragile relationship to performance contradictory to the study by Eskildsen *et al.* [28]. In addition, six of ten measures confirmed in earlier climate studies of creative work environments were found to have poor reliabilities, contradicting findings of earlier studies [5, 6, 23, 35, 36] raising the possibility that creative organizations differ from non-creative organizations specifically in terms of time pressures and demands and resource availability.

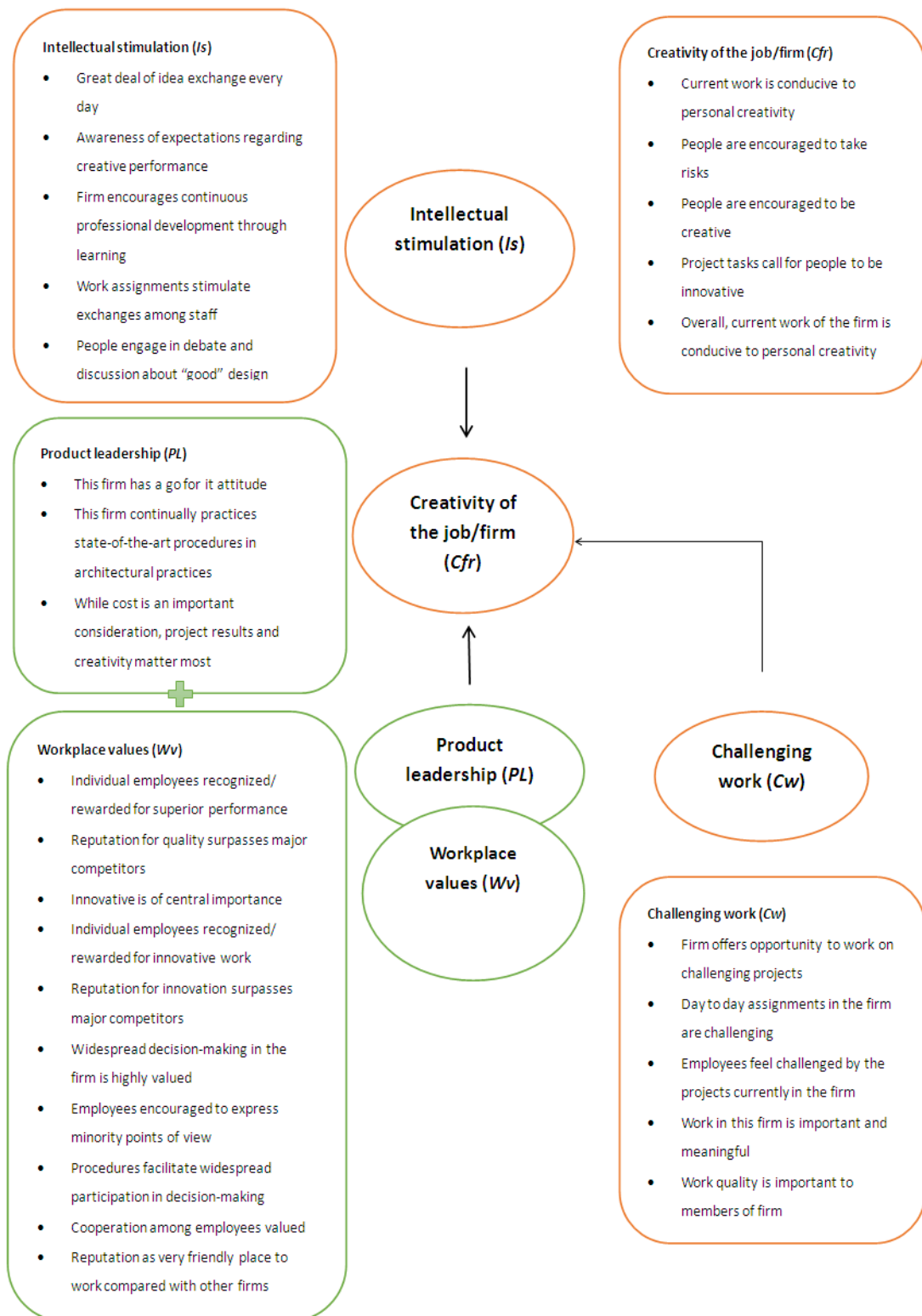


Figure 2. Intellectual stimulation, product leadership + workplace values, and challenging work as influencers on creativity of the job or firm as a component of organizational creativity

Intellectual stimulation, the value discipline of product leadership, and workplace values appeared to strongly influence organizational creativity and to a lesser degree, challenging work. Findings support the more creative the firm, the greater the revenues; firms can benefit from

understanding dimensions of creativity in the workplace to enhance their revenue performance.

Shalley, Gilson, and Blum [51, p. 216] stressed the importance of complementary work environments inclusive of proximal (job complexity) and distal job factors. Jobs

designed to be highly complex, similar to work roles in architectural practice, offer greater incentive to be creative especially in environments where creativity may be manifested as an intangible “requirement” [56]. An inverse relationship was found between creativity and length of tenure in practice. This may be a daunting finding to senior design management, and may bear further attention in terms of how one embraces the factors of creativity as practice tenure approaches a significant length of time.

The exploratory nature of this study attempted to create a foundation for future studies of performance, moving into more proprietary realms requiring firm sponsorship to examine additional performance variables. However, certain features of the study suggest if practitioners could evaluate contributions to creativity, it might be possible to track and monitor changes, improvements, or decline in creativity.

Findings supported the assumption that organizations characterizing themselves as creative would align with the product leadership value discipline, as an indicator or innovation. The measures developed for the three value disciplines described by Treacy and Wiersema [55] were useful in confirming firm employees’ value choices, with operational excellence reflected as a negative relationship and respondents reflecting stronger alignment with product leadership than customer intimacy value structures. Responses to these measures suggest firms may be able to refine decisions regarding Treacy and Wiersema’s [55] operating models by using these indices.

5. Limitations and Avenues for Future Research and Practice

Increasing the number of firms and respondents would allow greater affirmation of findings from the study; case study analysis of a sampling of firms to expand upon findings would invite elaboration of the items within indices constructed in this study. Although a great number of architectural practices are in fact sole practitioners, since the majority of research studies of non-creative organizations focused on large scale organizations, the firms in the study allow examination of creative to non-creative firms. Additional research might also focus on the roles of incentives in fostering organizational creativity.

References

- [1] Agresti, A., & Finlay, B. (1997). *Statistical methods for the social sciences* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.
- [2] Amabile, T. M. (1988). A model of creativity and innovation in organizations. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior*, 10 [pp.123-167]. San Diego, CA: Elsevier, Inc.
- [3] Amabile, T. M., & Center for Creative Leadership. (1990). *KEYS®: Assessing the climate for creativity*. Greensboro, NC: Center for Creative Leadership.
- [4] Amabile, T. M., & Center for Creative Leadership (CCL). (1987, 2009). *KEYS®: To creativity and innovation*. Greensboro, NC: Center for Creative Leadership.
- [5] Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *The Academy of Management Journal*, 39(5), 1154-1184.
- [6] Amabile, T., & Gryskiewicz, S. S. (1989). The creative environment scales: Work environment inventory. *Creativity Research Journal*, 2, 231-253.
- [7] Aspelund, K. (2006). *The design process*. New York: Fairchild Publications.
- [8] Axtell, C. M., Holman, D. J., Unsworth, K. L., Wall, T. D., Waterson, P. E., & Harrington, E. (2005). Shopfloor innovation: Facilitating the suggestion and implementation of ideas. *Journal of Occupational and Organizational Psychology*, 73, 265-285.
- [9] Baer, M., & Oldham, G. R. (2006). The curvilinear relation between experienced creative time pressure and creativity: Moderating effects of openness to experience and support for creativity. *Journal of Applied Psychology*, 91(4), 963-970.
- [10] Basadur, M., & Gelade, G. A. (2006). The role of knowledge management in the innovation process. *Creativity and Innovation Management*, 15(1), 45-61.
- [11] Birnberg, H. G. (1999). *Project management for building designers and owners* (2nd ed.). Boca Raton, FL: CRC Press.
- [12] Blau, J. (1984). *Architects and firms: A sociological perspective on architectural practice*. Cambridge, MA: MIT Press.
- [13] Bonnardel, N., & Marmèche, E. (2004). Evocation processes by novice and expert designers: Towards stimulating analogical thinking. *Creativity and Innovation Management*, 13(3), 176-186.
- [14] Bureau of Labor Statistics. (2009, May). 2009 *National Occupational Employment and Wage Estimates, United States*. Washington, DC: Author. Retrieved from http://www.bls.gov/oes/current/oes_nat.htm#17-0000
- [15] Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, validity and factor structure of the creative achievement questionnaire. *Creativity Research Journal*, 17(1), 37-50.
- [16] Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159.
- [17] Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152.
- [18] Collins, M. A., & Amabile, T. (1999). Motivation and creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* [pp. 297-312]. Cambridge, UK: Cambridge University Press.
- [19] Cowdroy, R., & de Graaff, E. (2005). Assessing highly-creative ability. *Assessment and Evaluation in Higher Education*, 30(5), 507-518.
- [20] Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.

- [21] Csikszentmihalyi, M. (1988). Society, culture, and person: A systems view of creativity. In R. J. Sternberg (Ed.), *The nature of creativity: Contemporary psychological perspectives* [pp. 325-339]. New York: Cambridge University Press.
- [22] Cuff, D. (1991). *Architecture: The story of practice*. Cambridge, MA: MIT Press.
- [23] Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal*, 34(3), 555-590.
- [24] Drazin, R., Glynn, M. A., & Kazanjian, R. K. (1999). Multilevel theorizing about creativity in organizations: A sensemaking perspective. *Academy of Management Review*, 24, 286-307.
- [25] Dul, J., & Ceylan, C. (2011). Work environments for employee creativity. *Ergonomics*, 54(1), 12-20.
- [26] Ekvall, G., & Ryhammar, L. (1999). The creative climate: Its determinants and effects at a Swedish university. *Creativity Research Journal*, 12(4), 303-310.
- [27] Ensor, J., Pirrie, A., & Band, C. (2006). Creativity work environment: Do UK advertising agencies have one? *European Journal of Innovation Management*, 9(3), 258-268.
- [28] Eskildsen, J. K., Dahlgaard, J. J., & Nørgaard, A. (1999). The impact of creativity and learning on business excellence. *Total Quality Management*, 10(4 & 5), S523-S530.
- [29] Fields, D. L. (2002). *Taking the measure of work: A guide to validated scales for organizational research and diagnosis*. Thousand Oaks, CA: Sage Publications, Inc.
- [30] Florida, R., & Goodnight, R. (2005). Managing for creativity. *Harvard Business Review*, 83(7/8), 125-131.
- [31] Gardner, H. (1988). Creative lives and creative works: A synthetic scientific approach. In R. J. Sternberg (Ed.), *The nature of creativity: Contemporary psychological perspectives* [pp. 298-321]. New York: Cambridge University Press.
- [32] Gardner, H. (1994). *Creating minds*. New York: Basic Books.
- [33] Gruber, H. E. (1988). The evolving systems approach to creative work. *Creativity Research Journal*, 1, 27-51.
- [34] Guilford, J. P. (1956). Structure of intellect. *Psychological Bulletin*, 53, 267-293.
- [35] Haynes, C. E., Wall, T. D., Bolden, R. I., Stride, C., & Rick, J. E. (1999). Measures of perceived work characteristics for health services research: Test of a measurement model and normative data. *British Journal of Health Psychology*, 4, 257-275.
- [36] Hunter, S. T., Bedell, K. E., & Mumford, M. D. (2007). Climate for creativity: A quantitative review. *Creativity Research Journal*, 19(1), 69-90.
- [37] Isaksen, S. G., Lauer, K. J., Ekvall, G., & Britz, A. (2001). Perceptions of the best and worst climates for creativity: Preliminary validation evidence for the situational outlook questionnaire. *Creativity Research Journal*, 13(2), 171-184.
- [38] MacKinnon, D. W. (1962). The personality correlates of creativity: A study of American architects. In G. S. Nielsen (Ed.), *Proceedings of the XIV International Congress of Applied Psychology*, Copenhagen, Vol. 2, [pp. 11-39]. Copenhagen, Denmark: Munksgaard.
- [39] Madjar, N. (2005). The contributions of different groups of individuals to employees' creativity. *Advances in Developing Human Resources*, 7(2), 182-206.
- [40] Majaro, S. (1991). *Managing ideas for profit: The creative gap*. London: McGraw-Hill.
- [41] Mathisen, G. E., & Einarsen, S. (2004). A review of instruments assessing creative and innovative environments within organizations. *Creativity Research Journal*, 16(1), 119-140.
- [42] Morgan, G. A., Leech, N. L., Gloeckner, G. W., & Barrett, K. C. (2007). *SPSS for introductory statistics: Use and interpretation* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- [43] Patten, M. (2007). *Understanding research methods* (6th ed.). Glendale, CA: Pyrczak Publishing.
- [44] Poldma, T. (2009). *Taking up space*. New York: Fairchild Publications.
- [45] Politis, J. D. (2004). Transformational and transactional leadership predictors of the 'stimulant' determinants to creativity in organizational work environments. *Electronic Journal of Knowledge Management* (2). Retrieved from <http://www.ejkm.com/volume-2/v2i2/v2-i2-art3.htm>
- [46] Pressman, A. (2006). *Professional practice 101: A compendium of business and management strategies in architecture*. Hoboken, NJ: John Wiley & Sons, Inc.
- [47] Rhodes, M. (1987). An analysis of creativity. In S. G. Isaksen (Ed.), *Frontiers of creativity research: Beyond the basics* [pp. 216 -222]. Buffalo, NY: Bearly.
- [48] Rosenberg, D. (2007). Assessing measurement equivalence of the KEYSTM climate for creativity scale across managerial levels. Unpublished master's thesis, North Carolina State University, Raleigh, NC.
- [49] Rubenson, D. L., & Runco, M. A. (1992). The psychoeconomic approach to creativity. *New Ideas in Psychology*, 10, 131-147.
- [50] Runco, M. (2004). Creativity. *Annual Review of Psychology*, 55, 657-687.
- [51] Shalley, C. E., Gilson, L. L., & Blum, T. C. (2000). Matching creativity requirements and the work environment: Effects on satisfaction and intentions to leave. *Academy of Management Journal*, 43(2), 215-223.
- [52] Sternberg, R. J., & Lubart, T. I. (1992). Buy low and sell high: An investment approach to creativity. *Current Directions in Psychological Science*, 1(1), 1-5.
- [53] Sternberg, R., & Lubart, T. (1996). Investing in creativity. *American Psychologist*, 51, 677-688.
- [54] Torrance, E. P. (1988). Creativity as manifest in testing. In R. J. Sternberg (Ed.), *The nature of creativity* [pp. 43-75]. New York: Cambridge University Press.
- [55] Treacy, M., & Wiersema, F. (1995). *The discipline of market leaders*. Reading, MA: Addison-Wesley Publications.

- [56] Unsworth, K.L., Wall, T., & Carter, A. (2005). Creative requirement: A neglected F construct in the study of employee creativity? *Group Organization Management*, 30(5), 541-560.
- [57] Van Dyne, L., Graham, J. W., & Dienesch, R. M. (1994). Organizational citizenship behavior: Construct redefinition, measurement, and validation. In D. L. Fields, *Taking the measure of work: A guide to validated scales for organizational research and diagnosis* [p. 284]. Thousand Oaks, CA: Sage Publications.
- [58] Vithayathawornwong, S., Danko, S., & Tolbert, P. (2003). The role of the physical environment in supporting organizational creativity. *Journal of Interior Design*, 29(1-2), 1-16.
- [59] Williams, W., & Yang, L. (1999). Organizational creativity. In R. Sternberg (Ed.), *Handbook of creativity* [pp. 373-391]. New York: Cambridge University Press.
- [60] Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a theory of organizational creativity. *Academy of Management Review*, 18(2), 293-321.
- [61] Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *The Academy of Management Review*, 27(2), 185-203.