DISSERTATION

ORGANIZATIONAL CREATIVITY:

THE RELATIONSHIP BETWEEN CREATIVITY, VALUES, AND PERFORMANCE

IN ARCHITECTURAL PRACTICE

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ABSTRACT

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Demand for creativity has moved from individual to organizational levels encompassing work environments in which organizations, competing for customers and clients, have reached a global imperative to innovate as the pace of change has escalated. Organizations must meet demands of talent shortages at a time when clients are demanding more for less. Creativity, as a means to produce innovative outcomes, allows organizations to embrace new ideas; *organizational creativity* integrates the creativity of individuals with needs at the organizational level inviting an environment of change; change requires organizational learning impacting the organizational context (Dennison, 1996) of climate and culture.

Architectural practice encompassing the design disciplines of architecture, interior design, and planning, represents a creative domain, and appropriate context in which to explore organizational creativity. Focusing the disciplinary lens of human resource development (HRD) on organizational creativity contextualizes the foundations of HRD--learning, performance, and change--in sustaining and nourishing the needs of organizational creativity, and at the same time defines a strategic role for HRD.

By examining responses of participants from five firms (N = 90), foundational knowledge was constructed about organizational creativity and its relationship to the constructs of creativity, values, and performance within the context of large architectural practices. Participant firms were drawn from a stratified random sample of *Architectural Record's* 2009 Top 250 Firms reporting annual revenues from architectural services only and were invited to respond to an e-survey.

Correlation and regression analysis examined the relationship of creativity, values, and performance shaping organizational creativity. The study also tested indices for three value disciplines to achieve market leadership proposed by Treacy and Wiersema (1995). A strong association was revealed with the discipline choice of product leadership and creativity.

Findings suggest creativity has a fragile relationship to performance contradicting the study by Eskildsen, Dahlgaard, and Nørgaard (1999). 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 (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Amabile & Gryskiewicz, 1989; Damanpour, 1991; Haynes, Wall, Bolden, Stride, & Rick, 1999; Hunter, Bedell, & Mumford, 2007); there may be differences in creative versus non-creative work venues (Ensor, Pirrie, & Band, 2006). *Intellectual stimulation*, the value discipline of *product leadership*, and *workplace values* appeared to have strong influences on a firm's creativity and to a lesser degree, *challenging work*.

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DEDICATION

This work is dedicated in memoriam to my mother and father, E. Katherine and Elmer Leigh, Jr. D.M.D. and to my maternal grandparents, Emma Katherine and Oscar Edward Johnson. You directed me toward a path of discovery in sharing your passions for learning and education; not a day passes without each of you in my thoughts.

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INTRODUCTION

> *The necessity for organizations to manage creative capability, transform new concepts into value in competitive markets and, subsequently, into profits for the firm introducing the innovation, has been a driving force for business leaders to better understand the dynamics of creativity and innovation, and to develop and execute strategies to leverage the workforce, intellectual capital, and the physical workplace to increase innovative output for the organization.*
>
> *Stegmeier, 2008, p. 73*

Is everyone creative in some way or another? Everyday creativity allows each of us to flexibly adapt, improvise, and try new things suggesting each individual has the potential to enrich personal experiences through creativity (Richards, 2007). The call for creativity has moved from individual to organizational levels encompassing work environments in which organizations, competing for customers and clients, reach a global imperative to innovate as the pace of change escalates to unseen heights in the world of business. Organizations must meet demands for talent shortages at a time when clients are demanding more for less. Creativity, as a means to produce innovative outcomes, allows organizations to embrace new ideas; *organizational creativity* integrates the creativity of individuals with the needs of the organization inviting an environment of change, in turn, promoting learning. Creative organizations demonstrate flexibility, adaptability, autonomy, leadership, and peer support in creating positive change in the workplace influencing performance in terms of products, service outcomes, and recognition.

Architectural practice encompassing the disciplines of architecture, interior design, and planning, represents a creative domain, and an appropriate context to explore

organizational creativity. Focusing the disciplinary lens of human resource development (HRD) on creativity appropriately contextualizes the foundations of HRD-- learning, performance, and change--necessary for organizational creativity.

Creativity in Organizations

The research literature has richly addressed factors comprising creative environments and processes in studies of organizational climate (Amabile, 1988, 1996; Amabile et al., 1996; Amabile & Gryskiewicz, 1989; Damanpour, 1991; Ekvall & Ryhammer, 1999; Hunter, Bedell, & Mumford, 2007; Isaksen, Lauer, Ekvall, & Britz, 2001; Oldham & Cummings, 1996; Santanen, Briggs, & De Vreede, 2004) but few empirical research efforts have been conducted to further an understanding of creativity's influence on organizational performance in a manner that can be applied in practice (Bertola & Teixeira, 2002; Eskildsen, Dahlgaard, & Nørgaard, 1999; Majaro, 1991). Further, limiting research to climate variables denies the relationship of climate to culture in organizations ignoring the role of values affecting actions and behavior by individuals at the organizational level (Mamatoglu, 2008); Bock, Zmud, Kim, & Lee (2005) reference Dennison's (1996) definition of *organizational context* when the integral relationships of climate and culture are considerations in the workplace.

Creativity remains an elusive and intangible contributor to workplace performance and change despite emphases from psychoeconomic perspectives (Cohen & Levinthal, 1990; Rubenson & Runco, 1992; Zahra & George, 2002); agreement on the definition of the construct remains unresolved. Although creativity serves as the mantra for organizations competing in the global economy, Florida and Goodnight (2005) point out "…businesses have been unable to pull these 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" (p. 125).

Basadur and Gelade (2006) noted organizations need to improve performance to capitalize on rapid change and establish or regain a competitive edge (p. 45). Factors affecting creativity in the workplace have been studied in other professional domains suggesting encouragement, autonomy and freedom, and resources promote creativity in the workplace. 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 suggested as negating the role and presence of creativity (Amabile et al., 1996).

Creativity inherently promotes the crossing of discipline boundaries and study of interrelated influences (Haring-Smith, 2006); however, the search for construct definition beyond the boundaries of the creative disciplines has offered little reference to creativity at the organizational level. Although Amabile et al.'s definition of creativity has been widely accepted as "the production of novel and useful ideas in any domain" (1996, p. 1115), Cowdroy and de Graaff (2005) defined what is '*understood by the idea of creativity',* rather than what is meant by the word '*creativity*,' providing a mindful view of different venues encompassed in creativity research. "The *idea* of creativity embraces a multiplicity of notions, including imagined (conceptual) *ideas*, development of *schemata* (constructs, analogies, diagrams, etc.) emanating from the ideas, physical

execution of ideas (the activity of making, performing, etc.), and created *products* resulting from the ideas (e.g., works of art, manuscripts, performances;" p. 508).

Creativity has described in terms of people, product, environment, and process (Rhodes, 1987) and used interchangeably with *innovation* in media and research efforts; differentiating between the two constructs is important in talking about the influence of creativity on performance and in understanding *organizational creativity*. Creativity has been treated as a characteristic of individuals whereas innovation has generally been attributed to groups, teams, and organizations, and related outcomes or products. Van de Ven and Angle (as quoted in McLean, 2005) defined innovation as "a process of developing and implementing a new idea" (p. 12). Amabile et al. (1996) linked both constructs by defining innovation "as the successful implementation of creative ideas within an organization" (p. 1155). Within the context of this investigation, creativity is defined as "the ability to approach the situation at hand with a fresh perspective, …link[ing] together previously unrelated or uncombined concepts, to generate new and unexpected ideas that solve a problem or capture an opportunity. "Innovation [is defined as] the synthesis of knowledge and ideas [and transforms]… knowledge and … ideas into new products, services, or processes; [with]…subsequent commercialization and diffusion through society and the economy" (Stegmeier, 2008, p. 72).

Despite a majority of research attributing creativity to individualized efforts, a focus on creativity at the organizational level, depicted as *organizational creativity,* has appeared in the literature. Williams and Yang (1999) defined organizational creativity as an adaptive entity "highlight[ing] the need for …[greater] employee autonomy, intrinsic motivation and commitment" (p. 389), not just individual creativity in a group work

setting. In a study of creativity within complex social settings, group creativity was identified 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 (Woodman, Sawyer, & Griffin, 1993). Majaro (1991) defined the creative organization encompassing factors concerning the removal of barriers demonstrating managed innovation, idea evaluation procedures, motivational stimuli, communication procedures, development of idea sources, and evidence of the creative planning process.

Climate and Culture in Organizational Creativity

Organizational creativity occurs at the interstice between creativity and innovation. In this transformative space, group actions are reinforced by group diversity, characteristics, processes, and the work environment context (see Figure 1). Climate and culture characteristics create organizational context (Dennison, 1996) with group actions contributing to organizational creativity. These actions potentially alter the status quo impacting the organizational development process by embracing learning and change to effect performance. At the individual level, support is required to invite critical thinking to move ideas from the level of everyday or common problem solutions to the level of performance producing innovation influenced by group thought processes. At this transitory point organizational creativity is shaped by individual employee's perceptions of organizational context (climate) and the values and norms of the organization (culture). Conceptualizing Rhodes' (1987) approach to creativity, individual and group thinking represent the 'person'; the transformational process of creating, 'the process'; the context as 'press' or 'environment'; and innovative outcomes as 'product'.

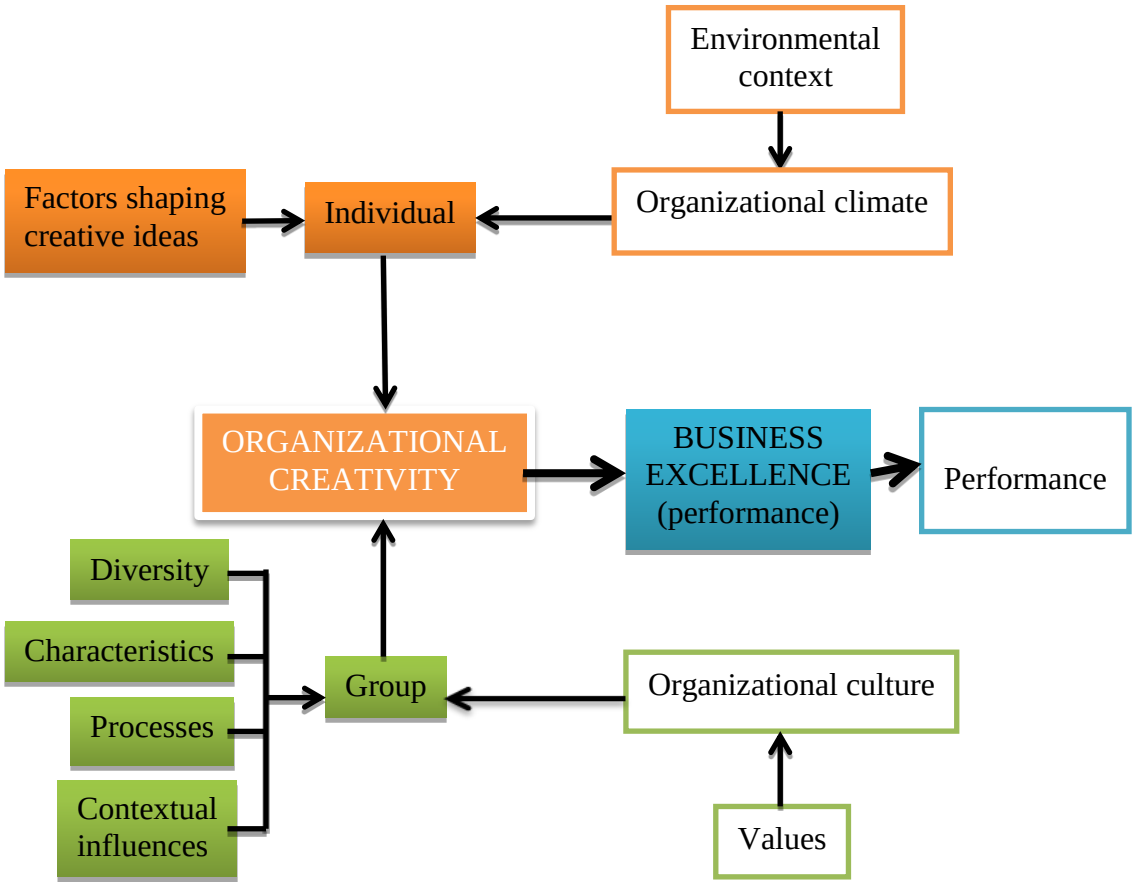

Figure 1. Organizational creativity serving as the transitional interstice between organizational culture (group) and climate (individual)

Climate, Creativity, and Performance

Organizational climate factors, identified by researchers including Hunter et al. (2007) in their meta-analysis of studies (see Appendix H) encompassing creative work environments and Damanpour's (1991) meta-analysis of determinants and moderators of innovation, identified specific psychometric measures. Measures encompassing climate factors were examined and found to be consistently reliable, valid, and insightful in assessing the creative work climate in a variety of organizational types (Damanpour, 1991; Hunter et al., 2007) including not-for-profit and for-profit organizations

encompassing research and development, manufacturing, service and mixed services. Specific instruments and measures utilizing organizational climate factors have also been used to assess the work environment for creativity with consistent results across diverse cultures (e.g., Carson, Peterson, & Higgins, 2005; Ekvall & Ryhammer, 1999; Isaksen et al., 2001; Mathisen & Einarsen, 2004). Validated individual work and job measures have been published with satisfactory factor integrity and reliability (Axtell et al., 2000; Fields, 2002; Haynes, Wall, Bolden, Stride, & Rick, 1999; Politis, 2004). However, examining climate factors alone does not provide a full picture of creativity in an organizational context (Ensor, Pirrie, & Band, 2006), especially in organizations considered to be creative or producing creative products. To simply characterize the context of an organization's work climate as creative ignores the influence of culture shaped by the values held by employees, encompassing organizational climate.

Eskildsen et al. (1999) examined performance conceptualized as business excellence suggesting research include "a more detailed questionnaire, especially regarding the creative organization and the learning organization…to analyse … implied relationships in depth" (p. S529). In the creativity literature, researchers have also called for an integrated approach (Cohen & Levinthal, 1990; Santanen et al., 2004; Tiwana & McLean, 2005; Woodman et al., 1993; Zahra & George, 2002) in which relationships among multiple factors are more fully investigated to comprehend the complexity of the creativity construct and to reveal new relationships influencing organizational creativity. More complex approaches invite complexity in research design and instrumentation, bringing to bear additional factors potentially contributing to creative work environments; however, a broader foundation is missing from the research literature to conceptualize

how creativity can be characterized in creative work environments, *what* value systems influence members of the organization to be more creative, and *how* performance factors relate to organizational creativity.

This investigation seeks to define the relationship of factors influencing creativity to help practitioners in using creativity to add value within an organizational context in which creativity has been assumed to have a direct relationship to success; architectural services are expected by the public to be creative, often providing value beyond client expectation. Creativity and innovation are thought to characterize the work environment and expected as outcomes of architectural services (i.e., generating new and creative ideas through their work). The relationship of performance to creativity, according to Eskildsen et al. (1999), is impacted by values held by employees of architectural organizations; values serve as a foundation for knowledge absorption promoting organizational learning.

Values in the Workplace

Values affect employees' attitudes toward work and the satisfaction derived from work. "Forces in the workplace such as organizational values, work cultures, and business goals shape the structures, strategies, and human resource processes of most successful organizations" (Stitt-Gohdes, 2007, p. 688). Day (1999) in *The Market Driven Organization* stated "…market-driven businesses were 31% more profitable than self-centered firms, while those that were customer-oriented and didn't pay attention to competitors were 18% more profitable than those that were self-centered" (pp. 13-14). Examination of value preferences can build a foundation for examination of externally driven business cultures aligning with Cohen and Levinthal's (1990) theory of absorptive

capacity (ACAP) as a measure of performance in market leadership. Empirical research is needed to understand the relationship between creativity and values.

Connecting Creativity to Human Resource Development

Organizational creativity's role in innovation and entrepreneurship is a key concern and requirement of organizations and businesses (Runco, 2004) inviting attention from Human Resource Development (HRD), especially in the area of organizational performance. "Imagination, creativity, change, and innovation are indispensable parts of HRD in [a]…dynamic business environment when time is essential and generating new ideas and solutions critical for organizational survival" (Madjar, 2005, p. 198). Complexity is on the rise in every facet of human experience; and within the context of human performance, new ideas are required by individuals and groups in the workplace to meet the challenges of this escalation and most importantly to enable understanding of critical influences on organizational creativity affecting performance.

Plakhotnik and Rocco's literature review (2011) found little evidence of interest by the Academy of Human Resource Development (AHRD) in its publication content focusing on organizational culture (p. 89). Organizational culture as an "organization-wide phenomena…consist[s] of a set of shared assumptions, values, beliefs, and behaviors …related to other organizational factors … [in] improv[ing] employee productivity, learning, or organizational effectiveness" (p. 91) linking HRD to organizational creativity through the influence of shared values. A dominant view was found supporting universalizing managerial interests, controlling nonconforming behaviors, and supporting homogeneity in the work environment, exactly opposite of the environment crucial to promote organizational creativity. A much broader view of

organizational culture, one in which values supportive of creativity, is necessary to better understand how HRD can effectively participate in the leadership of change and performance activities embracing creativity and in engagement with creative organizations.

Through more detailed investigations of creativity, organizational creativity, and connections to performance, a deeper understanding of creativity in the workplace and opportunities for HRD integration supporting creative domains can be exposed. Gibb and Waight (2005) suggested "connecting creativity with HRD means having to extend [the discipline's] knowledge about learning and building capacity for change at all levels" (p. 272). In the May 2005 issue of *Developing Human Resources,* devoted entirely to creativity, Gibb and Waight (2005) suggested:

- HRD as a discipline and profession is positioned to identify, support and lead the creative revolutions of the 21st century workforce and workplace;
- Creativity and HRD have strong links to knowledge and learning and with HRD practitioners' roles in promoting individual, group, and organizational learning…(e.g., connections through developing the creative class, enhancing social contexts, and changing cultures to promote innovation);
- Exploring the connections between HRD and creativity can affect core HRD constructs through improved articulation of creativity with accepted core HRD constructs (i.e., goal setting, self-efficacy, work design, job characteristics, leadership, and work groups);
- Other disciplines have faced the same challenge of connecting their domain to the construct of creativity; HRD has met challenges in the past; authors identify the research on creativity to date as a starting point for HRD research to provide the knowledge, concepts, and theories necessary to integrate creativity into the discipline of HRD;
- Integrating creativity into HRD may provoke biases and distortion causing minor consequences (i.e., what economists think about effective work processes with what psychologists think when enhancing creativity is the focus), or a major challenge, as in addressing a whole new employment paradigm; and

- Creativity affects HRD professionals via creativity in learning, learning creativity, organization creativity, and the socioeconomic context of creative capabilities (pp. 272-273).

HRD, with its foundation in psychology, economics, and social systems theory, encompasses "helping organizations…create the right learning environment, design performance management systems, and implement change initiatives…to alter an organization's structure, mission, strategy, leadership, managerial practices, and work environment" (Gilley, Dean, & Bierema, 2001, p. 1) providing an appropriate professional domain within which to strategically (Gilley & Gilley, 2003) foster and reinforce creativity through learning, performance, and change initiatives.

Currently, fragmented insights of creativity research efforts are evidenced in the HRD literature (Chen & Lai, 2009; Egan, 2005a; Gibb & Waight, 2005; Joo, Yoon, & Jeung, 2009; Madjar, 2005; Taylor & Callahan, 2005; Waight, 2005), through discourse and modeling (Basadur & Gelade, 2006; Egan, 2005b; Mosakowski, 1998). HRD is a late entrant into the creativity discourse which has been taking place since the 1950s. In the face of a lack of universal language and definition across disciplines engaged in creativity research and practice, HRD can offer objectivity by synthesizing construct characteristics. As the discipline of HRD continues to evolve, practitioners and academics will be required to develop and implement specific tools and expand critical knowledge about creativity affecting performance, especially in comparison to the attention creativity has been accorded in psychology and the social sciences. Gibb and Waight (2005) acknowledged HRD has communicated the importance of…its emphasis on performance and human capital theories but… has not applied this knowledge to creativity (p. 274). An opportunity exists to deepen the contributions of HRD in

performance. Articulating the enhancement of creativity through the field's diverse interests of knowledge management and learning, effective performance, and change management outcomes, organizational effectiveness can be demonstrated reinforcing HRD's position among creativity research activities. As Gilley et al. (2001) pointed out, creativity has the potential to bring about second-order or transformational change by questioning basic assumptions of the construct when integrating new practices, processes, procedures, and values to transform practitioners' responsiveness, focus, service quality and results (p. 4).

HRD through its respective foundations of learning, performance, and change offers the complexity required to examine the performance paradox whether creative performance is conceived at either individual or organizational levels. HRD's approach to performance has primarily focused on internal gap analyses using "systematic approach[es] to improving productivity and competence, through a process of analysis, intervention selection, and design, development, implementation, and evaluation designed to influence human behavior and accomplishment" (ISPI, 2000). Deterline and Rosenberg's model (as illustrated in Gilley et al., 2001, p. 109) captures this perceived gap in what is desired and what in reality is the way an organization is currently functioning. Given the intangible nature of creativity, these models have focused on *what and* need to be expanded to consider external indicators in examining creativity beyond the limits imposed by the four environments affecting human performance--worker, work, work environment, and organizational environment (Gilley et al., 2001, p. 190) to focus efforts on the *how*.

Performance in Practice

HRD has addressed performance at individual, group, and organizational levels to meet organizational missions and goals. Beyond the development of human capital, performance incorporates profitability, effective market penetration, and productivity. Productivity (e.g., fiscal indicators, profit margins, multipliers) encompasses worker satisfaction levels and unit outcomes; productivity, interpreted as performance can be expressed as procedures, interruptions, operational structures, and outcome efficiencies.

Measures of creativity could be included in the development of competency profiles for architectural practice if connected to performance in a useable form for practitioners. These competency measures could embrace the organization's mission, strategy, and goals; customer needs; jobs descriptions; and service processes. Evaluation of creativity levels could then be incorporated by assessing factors related to the work environment (e.g., job satisfaction, perceived management support) to employ comparative assessment to identify gaps between expectations and current reality. Until creativity is incorporated into management structures, its importance as a contributor to the work environment is marginalized if not neglected.

Economic Environment

Jennifer Riskus, American Institute of Architects (AIA) Economics Manager in *AIArchitect Weekly*, an online newsletter, reported on the state of practice relative to the Architectural Billing Index (ABI)[1]. In January 2009, the ABI fell to 33.3, the lowest point since its existence 13 years ago, reflecting depressed conditions at architecture

[1] As a leading economic indicator of construction activity, the ABI reflects the approximate nine to twelve month lag time between architecture billings and construction spending. From December 2009 (42.5) through August 2010, the ABI waivered below 50; in December 2010 the index was 54.2.

firms (Riskus, 2009, para 1). Generally, an index threshold of 50 indicates business conditions at productive levels with scores below 50 indicating declines from the previous month. From December 2009 to September 2010, the index remained below 50 as the recession impacted business conditions in architectural practice. "Uncertainty about 2011 remains as more architects are expected to seek other careers" concurrent with the ABI hovering above 50 and business picking up for the first time since mid-2007 (Riskus, 2011, para 1).

Architecture, as a creative discipline, continually struggles to remain profitable and viable in light of economic impacts such as those highlighted by Riskus (2009, 2011). Creativity, purportedly an inherent tool in this domain, remains an unharnessed factor to impact productivity. Architecture is not alone. "As geography and real estate become less important in connecting with customers, …sophisticated strategies for market connections of the market-driven organization – which are not tied to geography – are increasingly essential…and the complexity and differences among global markets means companies will have to challenge the strategies and approaches that worked in their home markets" (Day, 1999, p. 22) and in their past experiences.

Tim Reynolds, from Whirlpool's Global Human Resource group, shared the question of central interest to their CEO: "what performance indicators could accurately predict human capital optimization and organization health?" (T. Reynolds, AHRD conference keynote address, February 20, 2009). To take advantage of research findings, organizations require evidence and information directly identifying issues surrounding profitability and enhancement of their competitive capabilities in a globalized economy.

Statement of the Problem

The scarcity of research and evidence regarding how creativity affects performance and the relationship of values to creativity in creative professional domains such as architectural practice leaves design practitioners without realistic approaches to using creativity, or creativity research, as a catalyst for change and improved performance. Models which look at the influence of climate factors in the creative work environment, for example, in Amabile's work with the Center for Creative Leadership (1987, 2009), have offered confirmation of the extent and locations of creativity in non-design organizations but neglect to provide open-source transformational strategies to be implemented by organizations. Replications and examination of the instrumentation structure of the KEYS questionnaire (Baer & Oldham, 2006; Ensor et al., 2006; Rosenberg, 2007) have challenged construct comprehension and clarity surrounding time pressures and freedom; work processes may also have changed since the instrument's inception with the introduction of work technologies and information networks. Given the pace of business change since the 1980s, it is conceivable constructs have been impacted by a transformation of factors contributing to the creative work environment. The problem is, then, to reveal current factors predicting or influencing relationships among the constructs of creativity and performance informing design practitioners *where* and *how* leverage can impact work outcomes. This knowledge would inform practitioners in effectively creating flexible and fluid organizational structures to enhance creativity and as a result successfully meet the demands of rapid change in the marketplace.

Purpose of the Study

The purpose of this research study was to construct foundation knowledge about organizational creativity and relationships to the constructs of creativity, values, and performance within the context of a creative organizational domain--large architectural practices. Figure 2 presents the construct model guiding an examination of factors influencing organizational creativity.

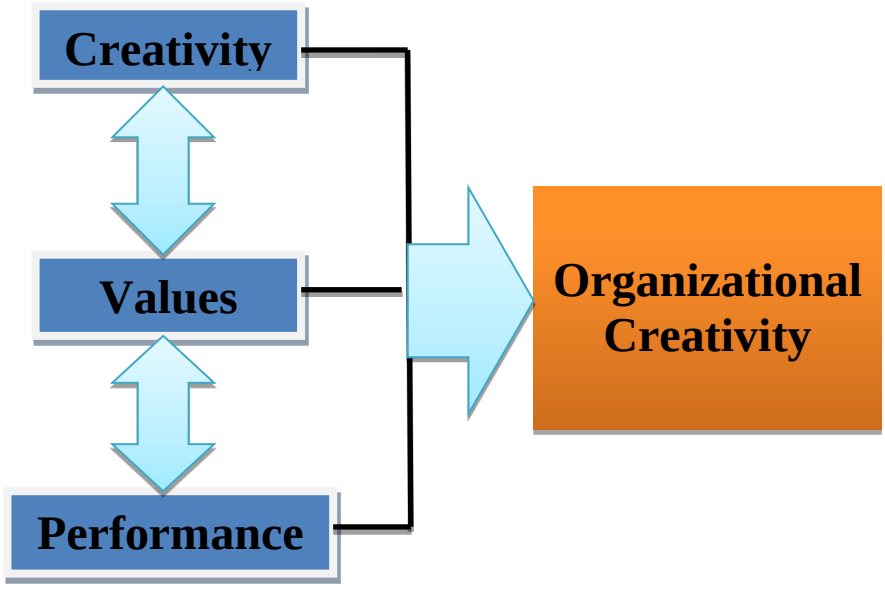

Figure 2. Construct model of factors with potential to influence organizational creativity

Research Questions

Five research questions guided the exploratory research undertaken to examine organizational creativity.

Q1: What is organizational creativity in architectural practice?

Despite domain conceptualizations of architectural practice presented by Blau (1984), Cuff (1991), Birnberg (1999), and more recently Pressman (2006) concerning architectural practice, creativity remains a hidden and intangible component. Pressman suggested "design solutions *must* become more creative and innovative (in response to

real-world constraints) to be considered architecture" (p. xiv). Architectural practice examined through the lens of creativity may contribute to an understanding of creativity in this professional domain and uniquely inform practitioners and educators specifically engaged in design and design education (architects, interior designers, landscape architects, and planners) of the physical environment. During a period in which significant numbers of individuals trained in architecture and related design disciplines are choosing not to enter or deciding to leave practice (Riskus, 2011), a better understanding of creativity in practice may offer new ideas and directions to attract and retain professionals and re-invent practice, re-emphasizing a prime reason for seeking architectural and design education in the first place, to be *creative*.

Baker, as AIA's Chief Economist, stated "architecture firms are generally inefficient, saddled by a 19th-century business model and tethered to the boom-bust economics of the real estate industry" (2011, p. 122); experience in practice dominates this positioning begging for new models capable of celebrating the domain's unique characteristics inclusive of creativity. Long considered a partnership of aesthetics and science, architecture and architectural practitioners have not been considered professionals on the same plane as medical or legal professionals despite registration requirements supporting the *health, safety, and welfare* of users. In a domain where 'creativity' is considered to go *hand in hand* with 'design' activities, identifying its source in the workplace (people, process, environment (press), or product; Rhodes, 1987), promoting actions inviting and supportive of creativity has been largely based on informal assumptions without formal verification. Locating *creativity* in the work

environment can lead to a better understanding the role creativity plays in a creative domain and its relationship to the factors inviting its presence in architectural practice.

Q2: Is there a relationship between values and creativity in architectural practice (V: C)?

Values, as enduring beliefs shared by members of a culture, about what is good or desirable and what is not, in the workplace, exert major influences on the behavior and perceptions of individuals affecting their choice of where to work and under what conditions. If the respondents of these firms consider themselves creative in some respect, they would be anticipated to choose alignment with measures indicative and correlated with measures of creativity, and reflect consistency in their perception of relationships between values and creativity measures.

Values were explored with four dimensions. *Job satisfaction* (*Js*) indicating personal fulfillment one experienced in these firms (person) and *workplace values (Wv)* as the extent to which firms placed importance on quality, innovation, cooperation, and wide participation in decision-making (process). The third dimension, *job interdependence (Ji)* indicated the extent to which collaboration or teaming was perceived as a component of the work environment of large scale architectural practice (process).

Finally, the choice of *value discipline (Vd)* to attain market leadership examined collective perceptions to test Treacy and Wiersema's (1995, p. 90) value discipline models for product leadership (*PL*) and a relationship to creativity. If creativity serves as a differentiating factor impacting organizational values, in creative organizations the choice of value discipline to achieve market leadership should demonstrate an alignment with product leadership (*PL*) given reliance of this discipline on creativity and

innovation. Study participants, representing top performers in architectural practice by annual revenues, should identify more readily with product leadership *(PL)* exhibiting a greater degree of creativity in comparison to the value disciplines of customer intimacy *(CI)* or operational excellence *(OE); PL < CI < OE*.

Creativity occurs in work environments in which people are both trained and not trained in creative processes, yet *how* creativity affects performance remains unclear. Examining this relationship may provide insights to leverage creativity's powers to impact market positioning and develop creativity as a tool to successfully impact performance. Does a higher level or even the presence of specific characteristics of creativity mean increased revenue? A differentiated view of performance is anticipated in the study by level of revenue; firms with higher measures of creativity might be expected to demonstrate higher revenues.

Q3: Is there a relationship between creativity and performance in architectural practice (C : P)?

Q4: Is there a relationship between value and performance in architectural practice (V: P)?

Annual ranked listings for *Architectural Record's* Top 250 Firms[2] (Linn, 2009) were compiled from self-reported data by firms with a breakdown by practice services (architecture, architecture-engineering, engineering-architecture, and alternative compositions including construction and other specialties), and total architectural revenue, in addition to domestic revenue, design revenue from architecture, and total design revenue. Examining differences in rankings and relationships to creativity may provide insight into the way in which creativity makes a difference.

[2] Data collected in 2008; published in June 2009.

Organizational learning, as an important foundation in HRD, embodies the values held by individuals in the organization. Organizations responding to change of varying magnitudes must be capable of learning. New ideas and ways of solving problems challenge people's value structures impacting and transforming thresholds for learning in an organization. Examining the relationship between value and performance may offer insights into creativity in practice and further examine the relationship between value and performance and the influence of organizational learning and organizational creativity (Bates & Khasawneh, 2004; Eskildsen et al., 1999).

West (2000) found "low market share predict[ed] higher levels of product innovations while environmental uncertainty predict[ed] administrative innovation (innovation in work organizations and people management systems… (p. 9). Given the decline of the ABI Index at the time of the study, executives could demonstrate greater levels of creativity confirming West's findings.

Q5a: How well does a combination of values and creativity predict performance in architectural practice (V : C : P)?

Q5b: How well does a combination of values and performance predict creativity in architectural practice (V : P : C)?

Investigating factors influencing creativity in architectural organizations requires the development of baseline information regarding interrelationships and influence among creativity, values, and performance to assist architectural firms in pinpointing areas to optimize their investment in human capital (Walberg & Stariha, 1992). Examining potential causality between creativity *(C)*, value (V), and performance *(P)* may provide ideas for leveraging creativity's power to affect performance in architectural practice.

Assumptions

Research during the development of the study design raised questions about the creativity of architectural firms--whether architectural firms exhibit the level of individual creativity assumed or mandated by client needs. In Portillo and Dorr's (2000) study, she found that faculty in related design disciplines considered interior design as more creative, for example. Assumptions surfaced regarding the expectation of finding creativity manifested in certain positions and across certain experience levels within architectural design practice. Locating the nexus of creativity is an important finding in examining performance and leveraging creativity to impact performance.

As an exploratory study, the potential to expose new relationships to be exposed is anticipated in addition to answering the research questions. Additional assumptions surrounding the inquiry encompassed observations from practice and review of the research literature.

- Challenging work and creativity may combine to represent one factor (Rosenberg, 2007).
- Freedom will be weakly supported by creativity, consistent with other studies (Rosenburg & Craig, as cited in Rosenberg, 2007), but observations will be made related to its relationship to values (Hunter et al., 2007; Strzalecki, 2000).
- Factors predicting/influencing creativity in the work place will be related to the constructs of creativity (Amabile & Gryskiewicz, 1989), performance, and values (including value disciplines).
- If climate factors moderate organizational learning and in turn the processes--creativity, performance, and values proposition--affect climate factors, then the exploration of influences becomes cyclical and allows for exploratory perspectives to expand theory (Ekvall, 1996).
- Both climate and cultural factors must be considered as affected by creativity.
- Workplace values will correlate with all three value disciplines (Treacy & Wiersema, 1995).

- Respondents demonstrating strong relationships to creativity will choose the product leadership value choice (Treacy & Wiersema, 1995), challenging and creative work environments, and demonstrate relationship to organizational encouragement, leader support and feedback (Amabile & Gryskiewicz, 1989; Mathisen & Einarsen, 2004).

- Workload demands and organizational roadblocks will consistently demonstrate negative relationships to creativity (Amabile et al. 1996; Baer & Oldham, 2006; Rosenberg, 2007), value disciplines, and performance.

- The relationship of time pressure to creativity, demonstrating inconsistent findings in past studies (Baer & Oldham, 2006; Rosenberg, 2007) can be examined in a 'creative setting' in which time pressure is certainly evident.

Terms and Definitions

The following terms define the contextual environment of this research:

Absorptive capacity (ACAP): the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends; this capability is critical to a firm's innovative capabilities and a function of the firm's prior knowledge (Cohen & Levinthal, 1990).

Architectural practice: a professional discipline addressing the forms and images of human habitat, the processes of its invention, its constructive technology, and its material fabrication; comprised of architects, designers and non-design staff; as a domain it has its own internal conventions of representation, judgment, and composition. (Wasserman, Sullivan, & Palermo, 2000, p. 36).

Capabilities-based approach: An approach to organizational learning based on discovery to enhance current ways of doing things to achieve objectives given available personal, material, and social resources. A normative approach to learning invites experimentation to develop new initiatives which are constantly monitored and revised; developmental approaches may find different rates of learning and change throughout the organization through stages of change with different units achieving transitions at different times.

Climate: recurring patterns of behavior, attitudes, and feelings that characterize life in an organization (Isaksen et al., 2001, p. 172).

Creativity: "the ability to approach the situation at hand with a fresh perspective, and link together previously unrelated or uncombined concepts, to generate new and unexpected ideas that solve a problem or capture an opportunity. "(Stegmeier, 2008, p. 72); "the production of novel and useful ideas" irrespective of domain (Amabile et al., 1996, p. 1155).

Customer intimacy value discipline: focus on the delivery of "not what the market wants but what specific customers want…cultivat[ing] relationships… [and] satisfying unique needs, which often only they, by virtue of their close relationship with--and intimate knowledge of—the customer, recognize...with the best solution" for the client by going the extra mile (Treacy & Wiersema, 1995, p. xiii).

Design: to create, execute, or construct according to a mental model; to make a drawing; a "process that allows for the intelligent, creative deployment of facilities to bring tangible benefits to organizations" (Brenner & Logan, 2007).

Design process: a cyclical sequence of steps or phases inclusive of analysis and synthesis (pre-programming, programming, schematic design, design development, construction documentation, contract administration, and post-occupancy evaluation).

Firm: a design or architecture organization; synonymous with *practice* when referencing design organizations.

Innovation: "Innovation [defined as] the synthesis of knowledge and ideas [that transforms]… knowledge and … ideas into new products, services, or processes; …. [with] their subsequent commercialization and diffusion through society and the economy" (Stegmeier, 2008, p. 72); innovation as "the successful implementation of creative ideas within an organization" (Amabile et al., 1996, p. 1155).

Generation M: people mobilizing to act very differently engaging in meaningful actions bringing about global change or resolving pervasive social issues (Haque, 2009); as a group may cut across true generational cohorts to represent people who adopt, act, and think in this manner.

Offshoring: architectural work being done beyond our borders to take advantage of skilled and less expensive labor costs (de la Llama, 2008).

Organizational creativity: an adaptive entity highlighting the need for greater employee autonomy, intrinsic motivation and commitment and not just individual creativity in a group work setting (Williams & Yang, 1999, pp. 373, 389).

Organizational culture: refers to norms of behavior and shared values among a group of people (Kotter, 1996) … [providing] cohesiveness among individuals throughout an organization and…developed over time (Gilley & Gilley, 2003 p. 74).

Organizational performance: the actual output, products, or results when measured against the organization's goals and objectives; measures may encompass

financial performance (ROI), customer service, corporate citizenship, and community service, or employee investment or stewardship.

Operational excellence value discipline: "provid[ing] middle-of-the-market products [and services] at the best price with the least inconvenience...keep[ing]low price and hassle-free service…with a no frills approach…" (Treacy & Wiersema, 1995, p. xiii).

Outsourcing: work being done by individuals who are not employees of the firm (de la Llama, 2008).

Product leadership value discipline: "concentrate [ion] on offering products [and services]…push[ing] performance boundaries… [with continual] innovat[ion]" (Treacy & Wiersema, 1995, p. xiii).

Transdisciplinary model: a model exploring organizational creativity integrating the ideas and approaches of diverse disciplines.

Value disciplines: three desirable ways companies can combine operating models and value propositions to be the best in their markets;" the three are product leadership, operational excellence, and customer intimate (Treacy & Wiersema, 1995, p. xii); the first of three concepts useful to business units. "The selection of a value discipline is a central act that shapes every subsequent plan and decision a company makes, coloring the entire organization, from its competencies to its culture…defin[ing] what a company does and therefore what it is." (p. xiii)

Value proposition model: "combination of operating processes, management systems, business structure, and culture that gives a company the capacity to deliver on its value proposition – the system, machinery and environment for delivering value" (Treacy & Wiersema,1995, p. xii); the second of three concepts useful to business units.

Value proposition: "the implicit promise a company makes to customers to deliver a particular combination of values – price, quality, performance, selection, convenience, etc." (Treacy & Wiersema, 1995, p. xii); the third of three concepts useful to business units.

Work values: Aspects of work comprised of specific needs important to one's satisfaction with the work environment.

Researcher's Perspective

From a purely methodological approach, this study embraces a postpositivistic position (Creswell, 2003; Trochim & Donnelly, 2006) grounded in functionalist theory.

The functionalist philosophy assumes the responses of employees engaged in architectural work are determined by causal relations to sensory stimulation and behaviors. The study's postpositivistic objectivity is a social phenomenon created by causal relations and best investigated by quantitative approaches aimed at multiple methods of confirmation. The knowledge gained from this study seeks to expand understanding of weakly or unproven propositions concerning the relationship of creativity and performance.

Architectural practice may be a domain exemplifying the Pareto principle with a small number of creative people leading the generation of creative solutions. Or, perhaps creative organizations really are different from other organizational types. When Ensor et al. (2006) tested Amabile's KEYS instrumentation and findings, they expressed reservations with the KEYS scales questioning cross-cultural application of findings with only two non-U.S. organizations in the KEYS data base. Ensor and colleagues considered pressures in the workplace to be incorrectly conceptualized based on reported findings indicating a very low pressure environment in describing a leading creative advertising firms in the UK; exactly opposite from reality. They suggested issues surrounding the role workplace obstacles, roadblocks, and pressures play require further attention.

In the creative workplace, the pressure of time may be perceived differently in a culture in which time demands are commonplace and the cultural belief that deadlines are the norm and overtime policies inconsistent. The relationship between creativity and time pressure requires further examination across broad employee positions and experience levels as well as firms.

A functionalist perspective is highly pragmatic with a goal of identifying measurable relationships affecting performance in architectural organizations (Burrell & Morgan, 1979; Drazin, Glynn, & Kazanjian, 1999). The research findings anticipate identification of meaningful indicators through an understanding of factor relationships and reliabilities of creativity and values (Amabile, 1996; Ekvall, 1996) further reiterating the need for a broader and potentially functionalist perspective integrated with the postpositivistic approach.

Distribution of an electronic questionnaire to a large number of respondents reinforce the positioning of the ontological and epistemological logic behind the study design. Knowledge derived from surveys of perceptual factors establishing a foundation for learning is an appropriate means of data collection. Finally, the investigation of associations seeks to introduce causality; the postpositivistic approach grounded in functionalism provides an appropriate initial inquiry into an obscure and exploratory set of relationships to be identified for future inquiry.

There is a strong desire for the findings of this study to be useable by practitioners. Architecture and design firms have rarely been the focus of research and when they have been, studies focused on personality traits and practice issues and not market performance. Treacy and Wiersema (1995), after publishing their treatises on market domination, directed attention to more in-depth treatments of customer intimacy (Wiersema, 1996) and organizational growth (Treacy, 2003) rather than continued expansion of the constructs of value discipline. Operationalizing the role of the research practitioner, a role recently addressed by the AIA, invites research informing practice and acknowledges the potential for a strategic role for HRD.

Insights from Practice

A posteriori knowledge over four decades of design practice motivated this inquiry; here a constructivist view reflects my perceptual position and the value placed upon my practice observations and experiences in major firms in the U. S. and Europe. I am a '*creative*;' *creativity envelopes my life's work, interests, activities, and pursuits.* Knowledge obtained from this investigation may initiate new paradigms for architecture and interior design practice. As the starting point for future explorations regarding how 'creatives' in practice view creativity, it is essential to define the reality of practice. Informed understanding about the relationships of the factors found to effectively and consistently measure creativity in firms can elaborate and locate *the value of creativity in architectural practice*!

These observations and experiences from practice and academia, since 1971, have allowed me to uniquely observe issues related to creativity and performance and to perform as a consultant in the areas of change management and strategic planning within the context of design organizations. The opportunity to actively research creativity in organizations from an empirical perspective has enriched and deepened my level of learning in combination with my practice interests. I have worked with architecture firms in a variety of geographic locations along the east coast; diverse firms from the largest in the U. S. and Europe to small practices encompassing five to twenty individuals and most recently with a firm of twenty-five architectural professionals in Hartford, CT. As a long term practitioner, I 'came up through the boards' rapidly attaining my first role as principal; I have experienced key management task required for successful practice; factors impacting financial performance. I observed creative ideas did in fact win

competitions and commissions and impacted financial performance as profit margins increased.

Often threads of ideas and interests become intertwined with an academic pursuit, and this has certainly been my experience. From my first doctoral class introducing the concept of value disciplines to achieve market leadership and reputation, initial ideas have become interconnected with my creative work serving as a foundation for what I hope will become a new chapter in my life, enriched with learning from diverse expertise of my advisors and practice partnerships.

My passion for creativity runs deep, stemming from practice experiences and more recently from teaching capstone and graduate students in interior design, further shaping my theoretical beliefs. Several key observations framed my interest in this study.

- Design professionals get inspiration to be creative in unpredictable ways; creativity is not always there when you need it;
- Financial performance is linked to organizational creativity; if the environment provides intrinsic motivation, autonomy, positive personal exchange and intellectual stimulation, the firm will prosper with creativity as a catalyst;
- The traditional atelier and studio structures of practice appear to negatively influence the development of creativity in practice by forcing methods and structures of practice to become rigid;
- Individual creativity cannot be empowered without group level creativity;
- *Creative requirement* appears to increase creative performance especially if followed by opportunities to apply creative thinking;
- Management in architectural practice follow rubrics that emphasize financial performance and job design rather than identification of alternative approaches to enhance creativity and influence market leadership;
- Many architects and designers do not have the tools nor are they trained to explore creativity in practice or through their academic preparation; and

- Creativity is a way of thinking and being, not a 9-5 task, suggesting it is not bound by time.

My study acknowledges these personal biases in my search for creativity in architectural practice. I believe design as a problem solving and creative discipline offers a unique perspective when integrated with HRD's three domains of learning, performance, and change; it is my hope to explore the potential for creativity to inform existing HRD structures or develop it as a fourth domain of the discipline. The public's affirmation of design as a necessary and required component of business seems to have out-paced that of architecture and related design professions; I hope that my research findings will open a venue of exploration for design firms encompassing the professions of the built environment to increase their competitive positions.

Delimitations

This study limits its focus to the experiences and attitudes of individuals employed by larger architectural practices in the U. S. who were earlier identified from a survey distributed by *Engineering News Record* (ENR). Rank was determined by self-reported architectural design revenues for 2008. Data were provided to ENR in its Top 500 Design Firm Survey and subsequently published by *Architectural Record* (Linn, 2009) listing the top 250. Firms whose practices reflected revenues from other sources (e.g., engineering, construction) were eliminated by the researcher. This process could have dropped some firms from consideration that would have better represented the population. Participants' responses may not reflect the experiences of all architectural professionals; small firms and sole practitioner offices and international practices whose

staff perceptions are influenced by differing cultures (Ensor et al., 2006) were not included.

As noted by Blau (1984) and Kolleeny and Linn (June 2002), practice size and scale may influence perceptions of the social context of practice, supporting Damanpour's (1991) findings that scope of the organization was effective in moderating the relationship of creative work climate factors. For the purposes of this inquiry, selection of large scale practices allowed the potential for responses from larger aggregated staffs and the potential for comparison of data with large non-design corporate entities of similar scales in the future. While these firms are distributed across the U. S. and reflect certain diversity in geographic location of the firm, no measures were taken to ascertain practice distributions reflected a balance of urban and non-urban practices or projects or similarity in firm structure.

It must be noted that the time period for data collection, 2010, reflected a time in the U.S. economy when architectural firms and the global business community scrambled for revenues and survival (Gordon, 2008; Economics condition…, February 2009). Since this published listing of top firms was derived from 2008 data, firms may have potentially shifted in their productivity, experienced mergers, acquisitions, or demise. For that reason, the number of firms identified for sampling was doubled.

Examination of a single domain may invite an insular perspective that cannot be extrapolated to other disciplines. The selection of the domain, participants from top performing firms and the desirability to work in creative environments will hopefully challenge this perspective.

The study employed principals as gatekeepers to direct invitations to participate to their staffs. Gatekeepers may have interpreted and operationalized their roles differently and therefore the study respondents may have been inadvertently influenced by the manner of the invitation.

Finally, the study used an electronic survey tool with advanced data collection and computation features. While it is unlikely that any of these firms limit access to the Internet, there are organizations that control access to non-business related web sites.

Significance of the Study

From a Practice Perspective

In 2008, the AIA released their report on *External Issues & Trends Affecting Architects, Architectural Firms and The American Institute of Architects* (de la Llama, 2008). The report dealt with seven areas critical to practice.

1. *Political* (local, state, and federal): regulation or legislation that impacts design, construction and architecture.

2. *Economics* (interest rates, employment, offshoring/globalization): government, financial and industry data that indicates or predicts events that can influence the business of the firm and the demand for its services.

3. *Social/Cultural* (demographic trends, values, preferences, "green movement" etc.): information and data that explains preferences, needs and values of interest groups and target audiences.

4. *Technological* (information systems, communication, etc.): technological innovation in the marketplace that influences the operations, output and revenues of the firm or the profession.

5. *Design and construction industry* (construction activity, materials/supplies, residential and commercial clients' needs, insurance, disaster planning, etc.): events, data, and other information that impact the roles, practice, and decisions of architects and the clients and communities they serve.

6. *Architecture profession* (education, training, risk and liabilities, etc.) information, research data, and knowledge specific to members of the profession at various stages of their career development and practice.

7. *Association/Nonprofit environment* information on operational efficiency, member engagement, program effectiveness, and other data that can serve as indicators or trends in nonprofit management and service delivery.

Issues raised in this report provide targets and challenges relative to creativity's impact, especially in the economic, social/cultural, technology, and architectural profession arenas. A significant *Political* consideration involves institutional building activity tied heavily to tax revenues, bonds, and amendments. With shrinking tax revenues at the same time the U. S. is experiencing a large generational cohort of students and a growing baby boomer population, the availability and provision of institutional services requires creativity as the U.S. population outpaces social security benefits.

In the area of *Economics*, outsourcing and offshoring technological tasks as well as early phase project work sent overseas may be eliminating work for young entrants into the architectural process; and opportunities for those individuals to creatively engage in the profession.

In the S*ocial/Cultural* arena, increasingly, scientific and quantifiable research and observation are being used in the design process (Kopec, Sinclair, & Matthes, 2012; Nussbaumer, 2009). Social, cultural, and behavioral factors are strong influencers of design addressing efficiency, safety, comfort, and aesthetics. The position of research practitioner, introduced by the AIA in 2008, indicated transferable research is in demand by architectural practice. In addition, demand for sustainable design to reduce the impact of architectural projects' carbon footprint will require creative solutions minimizing impacts on the natural environment. Sustainability in design is an area of practice which

varies by region, with regional differences in rate and depth of adoption, requiring adjustments to practice values as well as building performance relative to cost effective green products. Information concerning creativity, performance, and value systems could help firms be more effective in their work and client relationships bringing the role of the human resource practitioner to a strategic level beyond that of overseer of benefits and time sheets within architectural practices.

Another issue involves the familiarity, reliance, and integration of *Technological* innovation in the lives of Generation M (Haque, 2009) introduced new but different, although not necessarily better, communication patterns over larger geographic areas. Technology is changing the workplace and life at a pace not seen by older generations. Gen M's, with cognitive skills and habits very different from seasoned architectural professionals choosing not to change their work tools, may find themselves in the creative driver's seat, especially in the area of technological interfaces enhancing creative thinking. For those who cannot close the gap to mobilize and challenge yesterday's way of practice, demise or relegation to mediocrity may lead to a questioning of organizational and individual values. Establishing a creative work environment defines architecture's potential to be the creative problem solver for grander problems as noted by Farson (2008), promoting new avenues of growth and capitalizing on existing arenas of practice noted above.

Technological change is the fastest 'change' occurring in practice with a projection in less than 15 years architectural practice will be entirely virtual. "Collaboration and access to information have huge implications for how people [will] learn and work" (de la Llama, 2008, p. 10). "The concept of Building Information

Modeling (BIM) could be the "big bang" needed for green building… [and] technology can help harness the characteristics and performance of design concepts, allowing… [comparison of] sustainable alternatives to balance energy and resource efficiency with project costs. BIM incorporates energy analysis tools which in the next 10 years, [could save the U. S.] $4 billion in electricity costs, [reduce the need for] 175 new power plants, and significantly reduce carbon dioxide emissions" (p. 14). With 3-D modeling, BIM, simulation/analysis, and project collaboration software (p. 12), the gap between those who can practice and those who choose not to adapt to technology's role will be unable to compete. Organizational creativity will be in even greater demand as firms seek to remain flexible, adaptive, and imaginative about ways to integrate technology, expand understanding of what new technology can do, and ultimately push the envelope to develop greater technological capacities.

In the category of *Architecture profession,* attention is needed to stimulate selection of this domain as a career choice. Generally, a three year internship occurs after graduating, permitting new entrants to learn the *ropes* as an architect intern. In recent electronic discussions among AIA Associates, this designation has been termed denigrating and derogatory and appears offensive (personal communication, AIA Associates Member Conversations Digest, Thursday, March 24, 2011). Architectural graduates are choosing alternative career paths in construction, related design disciplines, and in unrelated professions and industries rather than entering practice or seeking to become registered as an architect. According to an AIA Survey (de la Llama, 2008), 62% of respondents identified this trends as the most significant. How will the profession address this gap? Although architecture is described as a *very creative* profession (de la

Llama, 2008, p. 15), architectural education is being perceived as a way to learn creative problem solving with a goal of skills applied to non-design ventures (AIA, 2007).

Technology has introduced an entirely new understanding of 'being creative' in practice, by both creative and not so creative individuals. By demonstrating ways that architectural practice is 'fun', the profession may impact the growing rate of architects looking outside the profession; however, coupled with the instability of the profession during recessions, new ways of doing business are needed. As fewer individuals seek registration in this profession, revenues of the AIA are affected, bringing about a secondary organizational need for creativity in dealing with a potential decline in membership revenues. If HRD practitioners, researchers, or consultants seek a leadership role in the area of [organizational] creativity (Madjar, 2005), engagement and research in these issues related to retention as well as professional development and performance will need to be a professional priority.

Design firms like their non-design corporate counterparts in domains including banking, insurance, retail, and entertainment continue to seek business from a global marketplace. One interesting finding of the AIA study (de la Llama, 2008) was as mega-firms grow and are more globally employed, they create an international niche market for smaller firms (p. 48).

The research objectives of this study examine the influences of creativity, performance and values in situ, deriving information to inform practice from those engaged in practice in the U. S. The findings from this study hope to inform architectural practices concerning the value of creativity in practice and where firms can maximize their presence for greater impact, pinpointing areas directly affecting creativity. The

findings may challenge architectural and design educators to emphasize creativity and its relationship to practice by engaging students of design in discourse and application of creativity in their academic work resulting in entry level practitioners using creativity to improve business performance.

From a Research Perspective

The obvious assumption, that creativity is an important construct, has been confirmed through the attention received in the research literature across diverse domains since Wallas' work in 1926. However, no 'one model of creativity' as suggested by Jeffcutt and Pratt (2002) has been developed to explain 'creativity' or 'the creative process' (Santanen et al., 2004) revealing a gap in the research literature regarding creativity's impact on performance and relationship to values at the organizational level; creativity manifests itself in different ways dependent upon its environmental context and domains. Challenges in language and definition heighten the multiplicity of meaning surrounding creativity particularly when it is envisioned as a cross-disciplinary construct; organizational creativity may invite a transdisciplinary model. Researchers have indicated more complex studies of creativity are needed to define what creativity is in practice and how it can influence productivity (Eskildsen et al., 1999). The structure of this study invites an integrated model of creativity, performance, and value selection to be examined with potential to develop a foundation for insights into factors affecting organizational creativity.

From a Market Leadership Perspective

Connecting organizational creativity to market leadership defines the role of creativity in architectural practice in a manner practitioners could internalize. Treacy and

Wiersema (1995) broadly described five components of value driven operating models as organization, culture, core processes, management systems, and information technology, but a detailed operationalization plan is needed to allow a firm to adopt the dimensions of value disciplines identified as operational excellence, product leadership, and customer intimacy. This study provides a starting point in identifying value choice and in looking at the relationship and role of creativity to values in the creative workplace.

Management support for creativity is crucial. Goleman (2000) suggested organizational climate influences leadership style, and in turn, leadership capabilities requiring focus on the tension inherent with managing 'creatives' and the creative process (Goleman, 2008, p. 1). Hunter et al. (2007) suggest,

> …leaders who have mastered four or more leadership styles – especially the authoritative (overall goal stated but people have the freedom to choose their own means of achieving it), democratic (giving people a voice in decisions, building organizational flexibility and responsibility and helping to generate fresh ideas), affilitative (people come first building team harmony and increasing morale), and coaching style (focus on personal development than on immediate work-related tasks) – have the very best climate and business performance (p. 11).

The Other Side of Creativity

While it seems creativity is needed to compete, this discussion would be incomplete without attention paid to the negative aspects of the creative imperative embracing organizations in addressing how HRD might influence this construct. There is a certain incongruity in trying to harness something that flourishes under autonomy and freedom. "In making creativity the current orthodoxy, and by focusing on the provision of an ontological basis for creativity (what is it?), we are actually subverting the true process of creativity" (Jeanes, 2006, p. 128). In her discussion of a Deleuzian perspective on creativity, she considers creativity as a virtual construct, one that is experienced, and

when ‘formed’ by current conceptualizations of creativity means that thinking has stopped; once we have territorialized it, “we…[lose] the ability to be truly creative” (p. 130). This thought is a red light for HRD in becoming a leader in creativity studies affecting improved performance; harnessing creativity as a set of tools, a definition, a process, and a product, may lose what is sought. The notion of “creativity as a process of personal and perpetual crisis, of knowing that concepts are not ‘finished’, of knowing one has not succeeded, of being thrown back into the open sea…this stands in contrast to our current image of creativity in which the creative process has outputs and outcomes; in which success is measured through… unit of capital” (Jeanes, 2006, p. 131).

When creativity creates the forces of change in such a manner that an entirely new paradigm, product, or service results, destruction of the original entity is assured. If one wants to introduce creative measures and subsequently sustain innovative technologies, the norm would be ‘work harder, plan smarter’ but destructive technologies entertain creative ideas that must be tossed before a good one succeeds; focusing investments and technology on the most profitable products currently high in demand by the best customers ultimately has led to the failure of organizations when they allow strategically important innovations to be bypassed by others (Christensen, 1997). Creative innovation requires continual reinforcement or redirection.

Radical innovation as a dimension of entrepreneurship has been embraced “as the basis for new technological trajectories and paradigms…an important part of the process of creative destruction in which extant techniques and approaches are replaced by new technologies and products” (Lassen, Gertsen, & Riis, 2006). The relationship between entrepreneurial behavior and innovation has been identified in the management

literature as ‘entrepreneurial orientation’ (Lumpkin & Dess, 1996; i.e., innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness). Similar characteristics have described creativity in the research literature. An imperative for HRD is to develop processes that do not negate creativity’s value and opportunities by trying to control its entrepreneurial appetite through organizational change.

Ford (2000) suggested “future organizational creativity research [by scholars]…should define creativity as a socially constructed assessment, emphasiz[ing] both sensemaking processes and outcomes (perhaps by recasting findings from functionalist-reductionist research), specify[ing] relevant stakeholders and domains, and adopt[ing] a “mental dialogue” metaphor as a way of investigating multilevel sensemaking processes that affect organizational creativity” (p. 285).

CHAPTER II

LITERATURE REVIEW

Design disciplines, in which creativity and innovation serve as prime directives, prepare individuals to lead through experiences utilizing special skill sets. These skills sets are used in designing situations, environments, organizations, and relationships embracing new requirements to effectively compete in a global economy (Farson, 2008). Shared employee empowerment, self-leadership, reduced gender bias, continuous learning, cooperative teamwork, multi-skilled and flexible—these characteristics describe workforce skills needed in the global economy in which employees are perceived as an investment versus an expense (Kotelnikov, 2011). Design encompasses diverse skills in problem-solving activities engaging creative human capital. Among other attributes, architects and designers working with clients from all market segments experience a unique understanding of the changing workforce encompassing conditions motivating employees, different orientations of a younger workforce, the questionable role of morale, unorthodox working arrangements, and differences between intrinsic and extrinsic rewards and the importance of personal engagement (p. 139). Through experienced-based observations, architecture as a domain embodies the potential for change through creative effort, and this change can affect organizational survival and effective organizational performance when examined through the perspective of HRD. A clearer understanding of creative capital in these organizations is necessary to capture the

power of design, with firms facing severe shortages of mid-level management and senior (executive) talent, scrambling to identify clients and projects for billable hours. Design and HRD are natural partners to examine relationships between creativity, value, and performance.

In the review of literature four areas were examined; creativity, values, performance, and practice framed by the following considerations.

- Creativity studies have only recently encompassed economic theories to provide managers and organizations with information to potentially impact financial performance (Cohen & Levinthal, 1990).
- Creativity's role in architectural practice has been taken for granted as an assumption of practice, yet many architects and designers note that creativity is a desirable aspect of their work, but may in fact not play a role in what they do on a day-to-day basis (H. Leibin, personal communication, July 28, 2009).
- Specific climate factors have been demonstrated as reliable indicators of a creative work environment regardless of organization type, capable of promoting creative thinking, creative problem-solving, creative processes, and creative products and services.
- Values reflecting the culture of an organization has not been examined in terms of relationships to climate factors and as Runco (2007) noted "values should be included in models of the creative process" (p. 312).
- Creativity has been attributed to improved performance in public media, yet little empirical data have supported a direct relationship.

Creativity

Creativity has been richly studied from disciplinary perspectives including psychology and sociology (behavioral, biological, clinical, cognitive, developmental, historical, psychometric and social perspectives) and in the disciplines of art and design, economics, HRD, business, organizational development, and education. In the early 60s, the Four P's of Creativity were conceptualized as encompassing *person*, *process*, *product*, and *press* (Rhodes, 1987), the latter referring to the physical and

social/environmental context within which creativity occurs. The creative person encompasses one context, represented by the artist or creator of "art" (i.e., music, performances, exhibitions, advertising layouts, architecture) where personal attributes of *being creative* were explored (Blau, 1984; Dudek & Hall; 1991; Kavanagh, O'Brien, & Linnane, 2002; MacKinnon, 1962; Portillo, 2002). Ways to strengthen an organization's creative capabilities have also been explored, with a champion of creativity building collaboration, exploiting knowledge, and enhancing relationships in and out of the organization (Napier & Nilsson, 2006, p. 268). A second context of creativity is the creative process shaping the organization's business environment (Basadur, 1992) examined through teaming and collaboration. The creative work environment, a third context, supporting creative processes and problem-solving has been examined extensively in the social science domains (i.e., the work of Amabile et al., 1996) with diverse influencing factors identified as consistent through meta-analyses (Damanpour, 1991; Hunter et al, 2007). The fourth context is the creative outcome or product.

Additional approaches have also been proposed to address *persuasion* (Simonton, as referenced in Runco, 2007), *requirement* (Unsworth et al., 2005) and *potential* (Runco, 2003). This study was concerned with creativity as an outcome of the value systems held by employees (person) influencing actions shaping creative ideas, solutions, thinking techniques, and designs (process), within the physical environment (press) of architecture firms. "Creativity may be the outcome of certain environmental forces playing upon certain individuals as they mature" in their work environment (Santanen et al., 2004, p. 170); the "focus of creativity research has been shifting…from separate foci on individual

skills and abilities and organizational environments to how these factors interact with each other to influence creativity and innovation" (Clark & James, 1999, p. 311).

Plucker, Beghetto, and Dow (2004) questioned the robustness of creativity studies based on a continued inability to define the construct. "Creativity is the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within social context" (p. 90). Usefulness or the utility of creativity, manifested in innovation is an expected consequence of meaningful work (Lips-Wiersma & Morris, 2009). In architectural practice, not all outcomes are characterized as creative; some projects are simply utilitarian in their objective. Defining creativity in projects and practice escapes clarity as one crosses the boundaries of diverse disciplines and constituencies.

Attention to creativity has been evidenced since Wallas' (1926) early examination of the creative process. This study acknowledges and accepts the challenges in *defining* creativity, moving to examine the *relationship* of this construct to architectural practice. By exploring creativity in top performing architectural firms, visualizing the components contributing to a causal model may direct firms to specific areas in which time and resources can be invested to achieve results (e.g., greater creativity, increased revenue, effective change).

Creativity in Architectural Practice

What does it mean to be creative in practice? Portillo and Dorr (2000) examined aspects of creativity within a design firm in which traditional design services developed into the pioneering of innovative design initiatives advancing corporate strategy; their study depicted creativity as developmental, showing mature and concept-driven

foundations. Creativity was characterized as complex, a synthesis of dichotomous traits and processes. Creativity also emerged as strategic, enhancing the identity and memorability of the client's product and services (p. 41). In practice, architects and designers talk of creative opportunities, creative environments, and creative people; however, the research undertaken by social scientists has been devoid of the richness found in practice captured through Portillo's narrative approach (2002). Postpositivistic approaches quantifying factorial measures benefit from a synthesis of practice with theory creating a working understanding of factors influencing creativity.

Pederson and Burton (2009) approached the ambiguity of the construct, *creativity,* applying formalized concept analysis to explore *definitions* in five architectural and general applied design scholarly periodicals, *critical attributes* of creativity defining important conceptual characteristics, and *antecedents* and *consequences* (p. 17). Their findings energized the idea of creativity with contemporary use of the construct: as a key competency in practice, as an influence on economic growth, as a key component in the development of breakthroughs influenced by new perspectives (p. 21).

Creativity and the physical environment. "Creativity has been underscored as a key factor to organizational adaptability and competitiveness in today's rapidly changing business environment" (Vithayathawornwong, Danko, & Tolbert, 2003, p. 1). The role of the physical environment is a factor in the development of a conceptual framework explaining the effect of personal, social-organizational and physical factors on employee creativity (Dul & Ceylan, 2011). Researchers found specific physical features and attributes of the work environment to exert indirect influences on creativity contributing to two significant social-psychological conditions conducive to creativity, dynamism, and

freedom (Vithayathawornwong et al., 2003). Budd (2000) identified the need for mental models paralleling user perceptions of organizational creativity collected from narrative methodologies. Hartman, Leigh, and Ningkun (2006) suggested the physical environment acts as an intangible asset in communicating organizational value. Each of these research inquiries reflects a contemporary visualization of creativity as a construct, elusive but important to organizations, inviting examination in new, more complex ways.

Organizational Creativity

The concept of organizational creativity characterized by Senge (1990) described organizational structures as responsive and adaptive to a constant flux of information and resources. Innovative performance produces an antagonistic paradox as organizations attempt to "challenge… managers to motivate optimal performance from employees for 'business as usual' tasks, while simultaneously setting… expectations to find innovative ways to strengthen the enterprise" (Stegmeier, 2008, p. 80). Vicari (1998) described high organizational creativity as continuous engagement of employees and managers in creative efforts leading to innovation; in contrast, low organizational creativity was evidenced in the context of managerial structures supportive of individual creative initiatives in a Japanese organization (Basadur, 1992; Nonaka, 2000). Basadur (1992) found creativity In a Japanese R & D setting a function of problem finding versus problem solution, maximized through implementation of Quality Circles and Employee Suggestion Systems (ESS). Employees were encouraged to identify problems individually then take responsibility for solutions.

Vicari's (1998) concept of organizational creativity (see Table 1) addressed individual and organizational levels. At higher levels, one might expect to observe high

rates of innovative performance (outcome) potentially engaging individual creativity. In Vicari's matrix, combinations of individual and organizational levels of creativity appear possible in the workplace. Low organizational-low individual creativity, lacking individual or organizational creative strategies to ensure business growth, characterizes status quo in organizations potentially leading to stagnation or decline, (Birnberg, 1999). Low organizational creativity with high individual creativity emulates the Japanese model of individual creativity influencing overall organizational creativity with problems defined or solved at micro-levels (Basadur, 1992). High organizational creativity with low individual creativity is an example of team-based problem-solving efforts, and perhaps to some extent a mode of destructive technology where teams harness organizational efforts aimed at improving the existing creative technology by simultaneously working toward replacement (Christensen, 1997). Finally, high organizational creativity paired with high individual creativity is manifested by embracing change and growth where creativity and innovation are valued and individuals collaborate in groups to produce a high rate of creative outcomes affecting organizational success and business excellence.

Table 1
Organizational and Individual Creativity

		Individual Creativity	
		low	*high*
Organizational Creativity	*high*	• Organizations based on continuous development, on systematic research of efficiency *(Japanese business model)*	• Successful organizations • High rate of innovations *(creativity is maximized and results in innovative products/services)*
	low	• Few innovations, primarily limitations • Not an effective organizations *(organization holding the status quo)*	• Low rate of innovations, sometime radical, based on entrepreneurial spirit of individuals *(can create frustrations or triumph in the work environment; see discussion of practiced creativity and destructive technologies)*

Note: Adapted from Vicari's 2x2 table (1998)

Creativity at an organizational level has been of interest to researchers since the early 90s. Organizational creativity has been conceptualized in diverse ways directed at differentiating group from individual creativity (Amabile, 1988; Majaro, 1991; Taylor & Callahan, 2000; Vithayathawornwong et al., 2003; Williams & Yang, 1991). Woodman et al. (1993) defined organizational creativity as "the creation of a valuable, useful new product, service, idea, procedure, or processes by individuals working together in complex social systems" (Woodman et al., 1993, p. 293). Woodman et al.'s (1993) interactionist model of creative behavior integrated important elements of the personality (e.g., Woodman, 1981), cognitive (e.g., Hayes, 1989) and social psychological (e.g., Amabile, 1983) explanations of creativity (Woodman et al., 1993, p. 294) linking Rhodes' (1987) four P's--creative persons, processes, environmental (social environmental), and products--demonstrating the interactive nature of these four scontextsin their model of organizational creativity. They hypothesized linkages among factors related to organizational creativity to include individual characteristics, social influences, individual creative performance, group creative performance, group characteristics, organizational characteristics, contextual influences, organizational creative performance and environment, reinforcing the need for systematic investigation of cross-level social and contextual influences.

Negative Creativity and Disruptive Innovation

Three modes of negative creativity contrast with the positive factors offered in the research literature. Negative creativity as an organizational context surfaced in the research literature (Clark & James, 1999) when workplace creativity is directed toward doing evil (p. 312). Clark and James identify individual and organizational uses of

negative creativity (i.e., actions by a terminated employee, a firm evading regulations, taking industrial secrets from competitors; p. 312). More recently, a focus on HRD's role in workplace incivility touched on negative creativity in terms of supervisor and coworker incivility requiring creativity in carrying out negative actions (S. Lyman, personal communication, January 3, 2011) potentially escalating to violence in the workplace. Amabile (1996) and Amabile and Gryskiewicz (1989) found negative organizational environments capable of impacting intrinsic motivation to engage in creative activities by individuals in the workplace. Motivation, one of Amabile's three components crucial in her componential model of individual creativity, is marginalized when negative creativity is allowed to enter the workplace, as in the example of incivility.

The third example of negative creativity leads the way for negative creativity to produce a positive impact. Christensen (1997) introduced the concepts of sustaining and disruptive innovation. A sustaining innovation improves the performance of an existing product and is valued by mainstream customers. Disruptive innovation exemplifies a dimension of negative creativity when the product or service manifests characteristics mainstream customers may not value initially, appearing as cheaper, simpler and of inferior quality. Disruptive innovation invites a minority to adopt in favor of earlier entities. When value-sustaining innovations (e.g., cell phones) produce a demand for better and improved services and products to outpace the competition in the global marketplace (Norton, 2005), a positive outcome can result from negative creativity 9e.g., movement of cell phone technology from 3g to 4g).

Creative Work Environment

Amabile and Gryskiewicz (1989) developed the Work Environment Inventory (WEI) as a paper-and-pencil test of specific climate constructs (see Table 2). WEI included 135 items for freedom, challenge, resources, supervisor, coworkers, recognition, unity, supports, time press, evaluation, status quo, politics, creativity, and productivity based on *a priori* analyses of other instrumentation and their research.[3] Designed as an organizational development instrument, WEI focused on factors most likely to influence the expression and development of creative ideas as stimulants or obstacles to creativity in the work environment. The researcher's theoretical foundation proposed individual creativity within an organization depended, in addition to skills and motivation, on three basic organizational components: skills in innovation management at the supervisory level, motivation to innovate at the organizational level, and availability of resources. In addition to information on factors studied in the past, observational study and content analysis of critical incident reports were used to develop items for the WEI. The internal reliability/consistency for the WEI was reported as $\alpha = .70$[4] with Pearson correlations from .72 to .93. Notably, the correlation between time pressures and creativity (-.07) resulted in low correlations (< .20) indicating little relationship. Researchers reported the WEI scales as highly relevant to both creativity and productivity (adjusted $R^2 = .60$ for creativity predictions; adjusted $R^2 = .62$ for productivity predictions). Effect size was not reported in these studies since the research took place in a similar time frame to Cohen's work on effect size and prior to American Psychological Association (APA)

[3] Data, statistics and analyses as reported in Amabile & Gryskiewicz, 1989.
[4] Alpha should be positive and greater than .70 to provide good support for internal consistency reliability (Morgan et al., 2007, p.129).

guidelines for inclusion of effect size; however, according to Cohen (1992), this would represent a large effect size.

Table 2
Factors included in the WEI (Amabile & Gryskiewicz, 1989) and KEYS (Amabile & CCL, 1989, 2009) Instruments

Measure/scale	WEI (1989) Definition	Measure/scale	KEYS (2009) Definition
FREEDOM	deciding what to do in one's work or how to do it; a sense of control over one's work	FREEDOM	deciding what work to do or how to do it; a sense of control over one's work
CHALLENGE	having to work hard on challenging tasks and important projects	CHALLENGING WORK	a sense of having to work hard on challenging tasks and important projects
RESOURCES	access to appropriate resources including people, materials, facilities, and information	SUFFICIENT RESOURCES	access to appropriate resources, including funds, materials, facilities, and information
SUPERVISOR	sets goals appropriately, supports the work group within the organization, values individual contributions, and serves as an intelligent, enthusiastic work model	MANAGERIAL ENCOURAGEMENT	a boss who serves as a good work model, sets goals appropriately, supports the work group, values individual contributions, and shows confidence in work group
COWORKERS	diversely skilled work group in which people communicate well, are open to new ideas, constructively challenge each other's work, trust and help each other, and feel committed to the work they are doing	WORK GROUP SUPPORTS	same
RECOGNITION	fair , constructive feedback on work, leading to appropriate recognition and reward of good efforts; an atmosphere where employees interests as well as their skills are recognized	Not included	not included
UNITY and COOPERATION	cooperative, collaborative organizational atmosphere in which there is a lively flow of ideas around a shared vision	ORGANIZATIONAL ENCOURAGEMENT	an organizational culture that encourages creativity through the fair, constructive judgment of ideas' reward and recognition for creative work; mechanisms for developing new ideas; and active flow of ideas; and a shared vision
CREATIVITY SUPPORTS	atmosphere in which creativity is encouraged and mechanisms exist to foster the expression and development of creative ideas	Not included	not included
TIME PRESSURE	too much work to do in too little time	REALISTIC WORKLOAD PRESSURE	absence of extreme time pressures, unrealistic expectations for productivity, and distractions from creative work
EVALUATION	threatening evaluation procedures; an atmosphere of excessive negative criticism of work	Not included	not included
STATUS QUO	emphasis in the organization on avoiding risks and doing things	Not included	not included

	the way they have always been done		
POLITICAL PROBLEMS	areas of the organization serving as hindrances to each other's work, through destructive competition, excessive concern about protecting territory, and other political problems in this organization	ORGANIZATIONAL IMPEDIMENTS	an organizational culture that does not impede creativity through internal political problems, harsh criticism of new ideas, destructive internal competition, an avoidance of risk, and an overemphasis on the status quo
CREATIVITY	creative, innovative organization or area of an organization, where a great deal of creativity is called for and where people believe they are actually producing creative work	CREATIVITY	a creative organization or unit, where a great deal of creativity is called for and where people believe they actually produce creative work
PRODUCTIVITY	efficient, effective, and productive organization or area of an organization	PRODUCTIVITY	an efficient, effective, and productive organization or unit

The KEYS inventory (Amabile, Burnside, & Gryskiewicz, 1995) was developed by Amabile and colleagues with the Center for Creative Leadership (Amabile & CCL, 1990); KEYS appears as a widely reported instrument in the literature; revised in 2009 as KEYS to Creativity and Innovation (Amabile & CCL, 1987, 2009) addresses issues with earlier instrumentation and update factors in the instrument. Amabile's initial development of the KEYS scales stemmed from the research on the WEI (Amabile & Gryskiewicz, 1989) with similar constructs found in both instruments. Table 2 identifies and compares original constructs of the WEI with those incorporated for the revised 2009 KEYS; other instruments developed to assess the climate of the work environment have incorporated similar measures.

Challenges to the KEYS constructs. Amabile and Gryskiewicz (1989) employed principle components analysis (PCA) with varimax rotation to assess the underlying structure for 14 identified scales.[5] Ten factors were requested; after rotation, the first

[5] Assumptions to be met include independent sampling which may not have been undertaken because samples were taken from participating organizations; assumption of normality, linear relationships between pairs of variables and variables being correlated at a moderate level; some variables like time pressures may not have met these assumptions.

factor (*organizational environment*) accounted for 10.3% of the variance; the second factor (*supervisor interaction with and planning for the group*) accounted for 8.6% of the variance; the third factor (*co-workers*) accounted for 5.6%; and the fourth factor (*resources*) for 5.0%. Reported eigenvalues were above 1.0. The statistics favored larger sample sizes indicative of the study sample, $N = 645$. All items in 8 of the 12 scales had primary loadings on one factor, with only items for *evaluation* split on two factors. Own-scale/other-scale correlations (between/within scale analyses) were conducted and indicated that on 9 of 14 scales, all items correlated strongly with their own scale. Test-retest reliability was deemed inappropriate for work environments due to change over time and therefore was not conducted for these studies.

To test construct validity, MANOVA and factorial ANOVA (analysis of variance to compare two or more groups based on the levels of two independent variables with a between groups design) were conducted to assess differences between items; *no findings were reported.* Correlation analysis was conducted across the creativity scale revealing 17 items correlating with each other ($r = .50$ or higher, $p < .001$). Finally, multiple regression analysis was used to concurrently predict creativity scale ratings from all environment scales and the productivity scale.

Findings regarding freedom were a point of contention (Rosenberg, 2007) and were not supported in Rosenberg's confirmatory study of the KEYS; in fact, no support was found for freedom. In Hunter et al. (2007), autonomy, used synonymously with freedom, reflected the lowest effect size of all variables considered. The relationship of challenge and freedom to creativity suggests additional exploration and assessment in actual environments are needed to elaborate on the inconsistency of these findings.

Rosenberg's (2007) research focused on measurement equivalence of the KEYS scales across three managerial levels hypothesizing employees' perceptions of the climate for creativity were significantly affected by managerial status, the basis for the KEYS, as well as other inventories and instruments developed to assess the creative work environment. The three management levels included supervisors (N = 2,100), middle managers (N = 15,829), and executives (N = 2,690). Aggregated responses were used to create indices for the organizational climate for creativity. Statistical analyses included both confirmatory factor analysis (CFA) and differential functioning of items tests (DFIT) based on item response theory (IRT) to assess measurement equivalency among the three groups.

Findings of interest included:

- primary loadings on single factors, with only items for *evaluation* split on two factors. Own-scale/other-scale correlations (between/within scale analyses) indicated that on 9 of 14 scales, all items correlated strongly within their own scale. Test-retest reliability was deemed inappropriate for work environments due to change over time and therefore was not conducted for these studies. *Political problems* were positively correlated with *creativity* (suggesting high conflict may inspire or promote creativity?);

- *Political problems* did not relate to *productivity* (suggesting the scales didn't indiscriminately assess +/- view of the organization;

- *Challenge* and *freedom* were stronger predictors of *creativity* than *productivity*, with *challenge* particularly important.

- measurement equivalence was found across managerial levels;

- the full 78 item KEYS scale displayed configural, metric, and scalar equivalence across the comparison groups;

- no differential functioning was found at either item or test level when using the full KEYS scale;

- EFA was conducted and resulted in an eight factor solution rather than the 10 factors identified by earlier analysis of the WEI;

- confirmatory factor analysis using all 78 items resulted in a poor model fit as a baseline model for each managerial level possibly due to the large number of items and factors; using only the five highest loading items and reduced 39 item scale produced an adequate model;
- *creativity* and *challenging work* combined; and
- no support was found for *freedom*.

Other researchers have addressed factors paralleling those of Amabile et al. (1996; Ensor et al., 2006; Majaro, 1991; Politis, 2004; Rosenberg, 2007) as well as examining creative requirement (Shalley, Gilson, & Blum, 2000; Usworth et al., 2005), time pressure (Baer & Oldham, 2006), work values (Haynes et al., 1999), theoretical modeling (Strzalecki, 2000), and an examination of creativity from a qualitative perspective (Edmonds, Muller, & Connell, 2006) with studies reporting large effect sizes for correlations among factors of the creative work environment.

Factor selection and consistency. Two consistent and major challenges to factor identification were inconsistent use of measures and definitions and inconsistency of statistics and validation measures across studies. Hunter et al.'s (2007) meta-analysis provided one source for contextual comparison, as discussed earlier, of factors presenting average effect sizes for similar variables as determined by expert examination, using Cohen's delta to calculate each factor's effect size across 42 studies. Factors producing large effect sizes were of central concern to this study's design confirming inclusion of the top three factors: *positive interpersonal exchange* (Δ = .91, *SE* = .39), *intellectual stimulation* (Δ = .88, *SE* = .18), and *challenge* (Δ = .85, *SE* = .14). *Support for creativity from management, supervisors and peers* was also deemed important in varied studies and *top management support* for creativity (Δ = .75, *SE* = .10) was added. Researchers

found factors producing small effect sizes were *autonomy* (freedom) with the smallest effect size (Δ = .48, *SE* = .09); *resources* (Δ = .51, *SE* = .19) and *reward orientation* (Δ = .55, *SE* = .14), contrasting statistically with Amabile's et al. (1996) findings. Pressures in organizations may have shifted over the past 10 years with the impact of these factors on organizational creativity also having shifted. *Flexibility* and *risk-taking* (Δ = .78) were excluded from this study with the assumption that these aspects of the creative work environment are inherent in the workplaces of creative domains and specifically within the realm of architectural practice.

Values

Studies investigating the relationship of values to creativity have been conducted since the 1960s (e.g., Allport, Vernon, & Lindzey's (1960) six-values model; MacKinnon's (1962) examination of creative individuals; and Schwartz's (1992) model of ten value composites with adjacencies explaining compatible and conflicting value relationships). Schwartz defined values as transituational goals that vary in importance serving as guiding principles in people's lives. Dollinger, Burke, and Gump (2007) suggested "creativity may, in part, be a function of the values held by creative people — what they strive for, cherish, or desire" (p. 91). Values serve as standards by which individuals' evaluate their social surroundings including their work environment. Their research findings suggested values, rather than traits as a component of personality, could be cultivated as conscious and changeable conceptions of what is desirable and could change in reaction to information (Dollinger et al. (2007), thus connecting creativity to learning and change and setting the stage for conceptualizing the relationship of organizational context and organizational creativity.

Organizational Climate and Cultural Values

Organizational climate refers to patterns of behavior, attitudes and feelings characterizing life in the organization. At the organizational level, climate has been found to act as an intervening influence with moderating power to affect organizational processes including motivation, creativity, and commitment (Ekvall, 1996, p. 106) influencing employee behavior (Ivancevich, Konopaske, & Matteson, 2010). In Hunter et al.'s (2007) meta-analysis, a variety of empirical climate studies were compared to evaluate effectiveness of factors assessing creativity in organizational environments by comparison of effect sizes; their findings indicated studies using standardized and tested measures were effective in measuring organizational climate.

Organizational culture as a related concept, impacts organizational climate by shaping beliefs and values held by people in the organization, through deeply held traditions and rituals enduring over time. In the practice of architecture for example, domain culture is grounded in rich design traditions of the Bauhaus; by architectural eminents, such as Frank Lloyd Wright; and contemporaries such as Frank Gehry. The culture of architecture is embedded in its design heritage, from the atelier mindset of learning from a master to avant-guard approaches and socially constructed design responses to sustainability. The *charrette*, within the domains of architectural and design disciplines, meaning to work on something until time has forced finalization, is an example of a cultural understanding transcending individual organizations and understood by a majority of practitioners in design. To those outside design disciplines, the charrette has been explained as a 'participatory workshop' but to design professionals

it means a shared experience in problem identification with rich history and meaning in terms of outcome, interactions, and excitement in creative problem-solving.

To close the gap between practice and theory, McGuire, Garavan, O'Donnell, and Watson (2007) suggested "organizational practices that are innovative provide opportunities to test accepted theories and, potentially, to build new theory" (p. 121). Budd (2000), director of STUDIOS Consulting Services, captured perceptions of …work environments using narrative inquiry to characterize…"mental models of …work environment[s] coexisting with the physical design models the firm constructs … Domains or categories of meaning were established to fit the project objectives while patterns within and between these domains are then identified … to capture [these] mental models …" (p. 59). "Using narratives, or voices, within the organization to uncover mental models of how people perceive work and what belief system affects their actions and perceptions" (p. 60) allows access to an understanding of how values affect the psychological, social, and physical configuration of the work environment.

Climate and culture are important to the study of organizational creativity. Creativity characterizes the culture of architectural practice, as an intangible and unspoken expectation of practice outcome; organizational creativity encompasses climate through the way in which creativity affects the actions, behavior, and attitudes of individuals as expressed through values (Mamatoglu, 2008) held by design and non-design members of architectural practices. In examining creativity at the organizational level, factors of the creative work environment encompass both climate and culture dimensions in characteristics of job expectations and values held by employees influencing behaviors eventually affecting the ability of an organization to maximize

creative performance (Reichers & Schneider, 1990). Denison (1997) conceptualized climate and culture as organizational context.

Factors were compared across six studies in assessing creativity in organizations (see Table 3). Studies show similar factors; however, not all factors were defined or labeled similarly in each research study, pointing out continued challenge in the literature related to construct definition. *Organizational support and encouragement* addressed the cultural aspects of creativity in terms of the manner in which the organization valued creativity through its mission, structure and protocols; from a climate perspective, reward and recognition for an accomplishment relies on values and beliefs. Distinguishing *organizational* from *management support* invites a climate perspective on management expectations through role modeling, providing feedback and encouraging new skill development. Peer support in the work environment, illustrated through factors encompassing expectations of *team collaboration and group or team support,* were not directly evident in measures used by Ekvall and Ryhammer (1999) and Ryhammer and Smith (1999), but an important climate construct to identify perceptions of constructive challenge (Haynes et al., 1999; Hunter et al., 2007).

Is creativity the same in creative versus non-creative organizations? Objective pressures may be more acceptable in terms of employee expectations in terms of *explicit pressures* (e.g., employee manuals and work environment compliance dealing with emergency exiting plans), and *implicit* pressures (e.g., the organization's culture defined as standards, norms, beliefs, and values held by organizational members (McLean, 2005; Runco, 2007). Subjective pressures encompassing the individual's perception of perceived contextual stimulants (Mraz & Runco, 1994; Murray, 1938) may characterize

the work climate or the behaviors, attitudes, and feelings distinguishing life in the organization (Ekvall, 1996) and therefore becomes the focus of climate studies. Climate, as practices and patterns of behavior (culture) rooted in values, beliefs, and norms, helps to make sense of life in the organization.

Table 3
Summary of Organizational Context Factors from Key Research Studies

Factor	**Amabile et al., 1996**	**Haynes et al., 1999**	**Ekvall & Ryhammer, 1999**	**Ryhammer & Smith, 1999**	**Nemiro, 2004**	**Hunter et al., 2007**
Organizational support	Organizational encouragement	-	-	Organizational structure Climate Culture	Norms and protocols	Mission clarity Positive interpersonal exchange Intellectual stimulation Reward orientation Participation Organizational integration
Management support	Supervisory encouragement	Leader support	Support for ideas	Leadership style	Leadership structure	Positive supervisor relations Top management support
Group/ team support Challenge Productivity	Work group support Challenging work Productivity	Peer support Professional compromise Role clarity	Challenge Debate	-	Connection Team member management conditions and competencies	Positive peer group Challenge
Resources	Sufficient resources	-	-	Resources	Communication tools	Resources
Freedom/ Autonomy	Freedom	Autonomy and control Influence over decisions	Freedom Trust and openness	-	-	Autonomy
Pressure	Workload pressure	Work demands	Time for ideas	Workload pressures	-	-
Roadblocks	Organizational impediments	Feedback Role conflict	Conflict and impediments	-	-	-
Creativity	Creativity	-	Risk-taking Playfulness and humor Dynamics and liveliness	-	Creative process/ work design approach Creativity techniques/ software tools	Flexibility and risk-taking Product emphasis

The Impact of Values on Creativity

Tesluk, Faar, and Klein (1997) found organizational values, beliefs, and assumptions, from which organizational culture arises, were reflected in more tangible aspects such as patterns of behavior, organizational structure, and physical work environment. People value what they choose to invest their time at work; therefore, values can be ascertained as representative of motives and behavior (Runco, 2007, p. 309). Hall and MacKinnon (1969) found certain values positively correlated with creativity with motivation mediating creative behavior and values. Kirkhaug (2009) studied value-based management in a learning and value-based company finding organizational commitment and group coherence positively correlated to perceptions of values among employees (p. 317). Unsworth et al.'s (2005) research found creativity happens because it is expected and in response to the perception one is expected to generate work-related ideas; creative requirement was found to fully mediate effects of supportive leadership and role requirements, as well as partially mediate the effects of empowerment and time demands, as a significant intervention to the work process (Unsworth et al., 2005).

Climate studies have principally examined contextual factors contributing to creativity in the workplace, but have not included values or value choice related to performance in their research designs. Attention to values held by the organization at either group or organizational levels and relationships to organizational creativity is not apparent in the creativity literature suggesting the potential for exploration of relationships among creativity, value, and performance.

Eskildsen et al.'s (1999) examination of the relationship among the creative organization, the learning organization, and business excellence (performance) found:

- an increase in measures for learning (from which *values* are derived in organizations) created an increase in business excellence;
- the impact of organizational creativity on organizational learning was not as large as the relationship between organizational learning and business excellence; and
- no direct impact of the creative organization on business excellence, suggesting organizational learning serving as a mediator between organizational creativity and business excellence.

In light of dynamic economic environments and productivity pressures within the creative workplace directly related to tacit understandings of creative requirement (Unsworth et al., 2005) and the assumption of architectural practice 'doing creative work', a closer examination of values related to market leadership (Treacy & Wiersema, 1995) may reveal relationships to characteristics of creativity important to practitioners.

Values, Learning, and HRD

Synthesis and transformation of knowledge influences design decisions and related outcomes. Learning, as one of the three pillars of HRD, with organizational performance and organizational change, has been supported primarily by training. Training has served as the intervention of choice, as a mechanism and venue for learning, by HRD practitioners and scholars to affect change impacting performance. Knowledge as a source of learning connects HRD to design practice beyond basic personnel activities of identifing and hiring creative people. The implementation of training as a response to re-framing organizational learning and achieving change invites creativity regarding the way information is delivered to impact people's value systems about the work climate. Individual assumptions affect beliefs, policies, principles, and practices adopted in the

organization, influencing one's actions and behaviors (Gilley et al., 2001). "Criticisms of structured training include… perceived lack of flexibility and creativity... [when]… facing learners in real time" (Korte, 2006, p. 514). Training is not the end all approach to successfully embrace creativity within the domain of HRD.

Knowledge acquisition. More recently the focus of organizational learning has been on 'learning solutions' redirecting emphasis away from short-term needs to building individuals' capacities to 'learn how to learn.' There is little agreement regarding connections between the roles of adult education and learning in the research literature (Gilley et al., 2001). However, four principal approaches to adult learning are evident as components of organizational creativity and the creative process: critical reflection (Dewey, 1933); continuous learning (Schön, 1973; Senge, 1990); action learning (Revans, 1982); and transformative learning (Mezirow, 2000).

Critical reflection (Dewey, 1933). The goal of critical reflection is to develop higher order thinking skills as a form of problem solving by thinking over a period of time and linking current experiences to past experiences resulting in new ways of thinking. *New ways of thinking* include metacognition and invite creativity by combining different elements to construct wholly new ways of doing, seeing, or thinking. In critical reflection, one analyzes, reconsiders, and questions experiences within the context of the world around them, providing unlimited possibilities for recombination (Surbeck, Park Han, & Moyer, 1991). Csikszentmihalyi's (1990) theory of flow as an individualized experience could inform HRD in creating environments allowing traits described by *flow* to occur by:

- demonstrating the incorporation of clear goals and expectations to be met by the employee;

- developing opportunities to concentrate one's focus on a specific task or set of tasks that is enjoyable;
- emerging self-consciousness and awareness;
- distorting sense of time as standing still;
- providing direct feedback to be able to make changes in the approach to an activity;
- promoting the ability to be challenged but not overwhelmed by the task;
- creating a sense of personal control over the activity;
- producing a sense of effortless action by having the activity hold intrinsic reward; and
- becoming completely absorbed in the activity itself.

"The more time a person spent in flow during the week, the better was the overall quality of his or her reported experience [at work…and they]…were likely to feel…"creative"…and "motivated" (Csikszentmihalyi, 1990, p. 158). Ackerman (1999) introduced "deep play" or time loss when engaged in an enjoyable activity; the duality of the work and play constructs are blurred as the barriers between work and leisure diminish (Florida, 2005; Hankin, 2005) and the physical construct of work and play become a mechanism to sustain creativity and innovation (Citrin & Smith, 2003). Play, as suggested by Kane (2004) has potential to dominant our way of knowing, doing and creating value.

In addition to linking flow and play through organizational learning's alignment with individual learning capacity, another area of influence is assisting people to become more conscious of their own capabilities and driving forces. An organizational environment centered on human growth and its potential might be structured to include creativity training that introduces the idea of thinking reflectively paired with on-going

opportunities to practice ideation, conceptualization, and abstraction. Many organizations have moved to include some form of creativity instruction in their training and development efforts (Solomon, 1990) although effects differ based on theoretical model and desired outcomes. Creativity training has not produced practical significance in terms of creative performance (Scott, Leritz, & Mumford, 2004).

In Smith's (2009) doctoral study of the effects of learner control and feedback in computer-based instruction (CBI), student cohorts with three years of education in an interior design program did not increase their creativity or require the same time parameters in creative problem-solving exercises in comparison to students drawn from introductory psychology classes. Outcomes related to the project (A. Smith, personal communication, December 10, 2008) suggested differences between people trained in disciplines with expectations for creativity as a component of their work (creative requirement) versus those educated in a profession that does not reinforce creativity. Smith proposed creative personal identity, the extent to which a trainee perceives creativity to be an important part of self-concept, as a potential moderator of the effectiveness of online creativity training design. In Jaussi, Randel, and Dionne's (2007) research, creative personal identity (CPI), a new construct in the creative performance research arena, predicted employees' creative behavior.

Continuous learning. Owen and Williamson (as cited in Dymock, 2003) described learning cultures as,

> one where the conditions for workplace learning are part of a work group's experience and history; where learning opportunities are valued to the extent that they are actively discovered, invented and developed; and are, structured into the organization's functioning so that opportunities for new learning could continue (p. 76).

Schön introduced the notion of the learning society and contributed the ideas of feedback, single and double-loop learning, as well as the idea of reflective practice (Argyris & Schön, 1978, 1996) suggesting organizations as social systems can learn and continuously adapt in a world experiencing rapid change. In Senge's (1990) *The Fifth Discipline: The art and practice of the learning organization*, continuous learning is promoted with organizations evolving as they master the process. Critics of Senge's philosophy have pointed out it is very difficult, if not impossible to identify an actual 'learning organization;' rather, firms might aspire to this state in terms of individual and organizational performance. In conceptualizing the organization as a learning system, creative tension is seen as a source of energy and renewal, using dialogue as a mechanism by which individuals can learn, absorb, and transfer knowledge.

Senge identified five disciplines: personal mastery, mental models, shared vision, team learning, and systems thinking. The challenge remains to connect individual and collective learning processes to the organization's strategic objectives in a manner inviting and engaging organizational creativity. The practices of the learning organization, in combination with critical reflection, may offer opportunities for HRD to influence creativity.

Action learning. Action learning allows broad interpretations to be made about its core features:

> Action learning is a means of development… intellectual, emotional or physical… [requiring] its subjects, through responsible involvement in some real, complex and stressful problem, to achieve intended change to improve their observable behavior … in the problem field (Revans, 1982, pp. 626-627).

Marsick and O'Neill (1999) characterized three different schools of practice related to action learning, each having distinct elements. The Scientific School is based

upon the scientific method of problem solving carried out in stages of learning. The Experiential School encompasses reflection on experience with the support of others followed by action and continued action, creating a pattern for learning how to learn; this latter approach parallels the processes in design studios and creative organizations where iterative ideation is a consistent approach in service or product delivery. The third school of practice, the Critical Reflection School, builds on reflection to transform perspective. Here, critical reflection uncovers disconnects in organizational norms and rewards group or team dynamics while working on real problems. These three Schools promote learning for the purposes of incorporating a more effective and instrumental problem-solving objective at their cores. Other learning concepts similar to action learning include *cross-functional teaming*, *ad hoc* or *permanent* approaches to problem solving, and the *work-out*, a one-time event versus a cycle of events; these activities are strikingly similar to the *design charrette* as a one-time event, short or long-term, bringing people together to creatively ideate problems and solutions for clients, communities, and societal challenges (e.g., sustainability, poverty, affordable housing).

Transformative learning practices. Transformative learning emphasizes contextual understanding beyond memorization, rote knowledge acquisition and learning facts. There is active engagement with questioning what and how one knows by critical reflection of assumptions and validation of meaning through reasoning (Mezirow, 2000). Mezirow's theory defines context as the biographical, historical, or cultural experiences within which new experience is embedded. Beliefs and values are questioned to enhance individual insight affecting problem-solving and decision-making. Mezirow defined transformative learning as "becoming aware of one's own tacit assumptions and

expectations and those of others and assessing their relevance for making an interpretation" (p. 4). In this approach to learning, alternate forms of communication are considered *other* ways of knowing, including intuitive communication through imagination and even dreams as a source for reflection and inspiration. This approach to knowledge acquisition invites creativity through examination of inputs that may not necessarily be placed together but allows the individual to examine alternative points of view to discover new assessments of information. Mezirow suggested that transformations in adult learning come about in four ways:

- elaborating upon existing frames of reference;
- learning from new frames of reference;
- transforming a point of view or beliefs; and
- transforming broad based assumptions filtering one's experiences.

Transformative learning also considers social or organizational change "as [the] objective, seeking others who share insights to form cells of resistance to unexamined cultural norms in organizations…; they become action agents in cultural change" (Mezirow, 2000, p. 30).

In focusing the best interests of human capital on creating a learning culture within organizations, promoting continuous learning (Senge, 1990) is a key requirement in generating new ideas; "the innovation process begins with the creativity of individuals…as a result of a cognitive process, located within individuals… [and]… fostered by the interaction processes" found in the workplace (West, 2000, p. 3).

Creativity, Creative Capital, and HRD

Richard Florida (2005) in *The Flight of the Creative Class* suggested we find ourselves in an age where global creativity defines "a nation's ability to mobilize, attract, and retain human creative talent… [with] every key dimension of international economic leadership, from manufacturing excellence to scientific and technological advancement… [dependent upon] this ability" (p. 3). His theory of creative capital suggests that highly skilled and sought after individuals, 'cultural creatives,' affect the development, availability, and preferences of the workforce with an impact on globalization at a macro level. He argues the creative cultural class, comprising roughly 20 to 40% of the workforce and earning a greater share of income and benefits, prefer geographic locations that are diverse, tolerant, and open to new ideas. He encapsulated his theory of economic development as a manifestation of technology, talent, and tolerance stating "[g]reater and more diverse concentrations of creative capital…lead to higher rates of innovation, high-technology business formation, job generation and economic growth" (Florida, 2002, p. 249).

The *McKinsey Quarterly (*Making the board …., 2008) noted "directors …want to focus on the long term, including analysis of trends, future scenarios, and global forces. As competition for consumers and talent intensifies worldwide and executives increasingly expect social and political trends to influence the bottom line, this shift in focus seems timely" (para 1). The invitation to connect organizational creativity to creative capital and organizational learning is embodied by Florida's (2002) remarks.

Creativity has not been a primary focus for research in the HRD domain. Two presentations at the 2009 annual conference in Washington, DC focused on creativity as a

construct; and a concentrated body of work appeared in the May 2005 issue of *Advances in Developing Human Resources.* Egan (2005b) suggested HRD professionals step up to the plate in preparing organizations, at both individual and organizational levels, to embrace creativity as a component of change addressing changing technologies, structures, client needs, and global issues to include sustainability and the challenge of sustaining organizational competitiveness. HRD in its respective domains of learning, performance, and change offers the complexity required of a disciplinary foundation capable of examining the paradox of performance with the advantages of creativity. Through development of learning environments simultaneously promoting productivity and creativity and support for innovative outcomes, the breadth of HRD's skills and knowledge has the potential to balance an organization's need to push forward while maintaining day to day operations.

Gibb and Waight (2005) stated "creativity and HRD have strong links with knowledge and learning and with HRD practitioners' roles in promoting individual, group, and organizational learning; but has not received the attention warranted in HRD research. Exploring and connecting creativity and HRD can lead to rethinking core HRD constructs…[in order] for creativity to become an accepted construct in HRD"…(i.e., self-efficacy, goal setting, job characteristics; p. 272). It is not surprising to find conceptualizations of creativity and innovation fragmented across diverse disciplines, from the arts to the sciences, encompassing socio-psychological to economic perspectives and variations in definition. Dimensions of creativity and innovation, for example, fun and play, have not been taken as seriously as other dimensions of creativity in the

research literature, potentially misdirecting a dimension of creativity's role in schemas for HRD, in which work can manifest play!

The fragmented evidence surrounding creativity as a strategically interrelated construct would benefit from research on factors affecting and effecting creativity in organizations. An examination of creativity, through the combined lenses of architecture, market leadership, and HRD to identify the importance, location and influence of creativity in architectural practice, offers a first step in understanding how, why, where, and when organizations can call upon creativity in day-to-day work transforming efforts to meet needs of the global workplace.

Gilley et al. (1999) framed creativity in HRD as a reward strategy to help enhance employee commitment in addition to long-term solutions, entrepreneurship, leadership, performance growth and development, teamwork and cooperation, and loyalty (p. 11). Organizational climates encouraging and rewarding new ideas, innovations, and out of the box thinking establish a climate of innovation (p. 145). Eagan (2005) reaffirmed "the fostering of creativity…[as] a necessity, not an option, for most organizations interested in responding to: (a) advancing technology; (b) … changing environment; (c) changing organizational structures or strategies; (d) overcoming competitors …improv[ing] their products, processes, and services; (e) evolving customer desires; and (f) evolving societies influenced increasingly by global issues and diversity" (p. 161).

Creativity in market leadership. Creativity and innovation research "represent a dramatic aspect of organizational change …provid[ing] a key to understanding change phenomena, and ultimately, organizational effectiveness and survival" within complex social systems (Woodman et al., 1993, p. 293). In a *McKinsey Quarterly* report

(Economic conditions…, February 2009) focusing on the findings of their survey of global economic conditions, 72% of respondents (1,310 executives) suggested government help should focus on fostering innovation versus helping existing companies or industries. Organizations are being asked to embrace mechanisms of organizational innovation requiring business systems thinking encompassing synergistic processes, the development and balancing of innovative systems, strategies for growth, and capabilities. These requirements lead empowered employees to build a winning organization moving organizational needs (Kotelnikov, 2011, n. p) beyond flexibility, service, and production differentiation and effective management of change (Ford, 1996).

Management consultants, Treacy and Wiersema (1995), approached market leadership and organizational productivity by modifying Porter's (1980) five-forces model emphasizing the integrative strength of five distinct competitive forces or features of the market and an organization's specific market segment to analyze long-term profitability and competition. These five forces included: suppliers, rivalry within an industry, substitute products, customers or buyers, and new entrants. Although Porter's model has been widely acknowledged and applied, critics have presented alternatives addressing greater specificity and refinement of the forces. In his 1980 classic, *Competitive Strategy: Techniques for Analysing Industries and Competitors*, Porter reduced the scheme to the three best strategies: cost leadership, differentiation, and market segmentation (or focus). Market segmentation is narrow in scope while both cost leadership and differentiation were relatively broad in scope. Within the context of architectural practice, these three strategies appear to hold true.

Creativity as a competitive organizational strategy has been explored through a variety of constructs important to business performance (e.g., trust: Dovey, 2009; density of the creative population: Knudsen, Florida, Stolarick, & Gates, 2007; and negative creativity: Clark & James, 2000). Eskildsen et al.'s (1999) study of chief executives included the Benelux countries (an economic union of smaller countries in Western Europe: Belgium, the Netherlands, and Luxembourg), Denmark, France, Germany, and the UK. Using structural equation modeling (SEM) researchers examined the relationship between organizational creativity, organizational learning, and business excellence. Their analysis found no direct association between organizational creativity and business excellence; rather, organizational learning acted as a mediating influence between organizational creativity and business excellence. Measures for business excellence were derived from factors identified in Fundamental Concepts of Excellence identified by the European Foundation for Quality (Figure 3). Of interest to this study is the relationship of values to the organizational learning component and the potential to link values, creativity, and performance in terms of business excellence as a measure of performance.

Treacy and Wiersema (1995) simplified Porter's model and identified three basic "value disciplines" to create customer value driving the competitive advantage needed by organizations to achieve market leadership; *operational excellence, product leadership,* and *customer intimacy*. Market leadership demands commitment and adherence to a value proposition and an unprecedented focus on the value components of price, time, premium service, and quality. In an environment of global competition they propose:

- different customers buy different kinds of value;

- as value standards rise, so do customer expectations; and
- producing an unmatched level of a particular value requires a superior operating model dedicated to just that kind of value (p. 19).

Figure 3. Fundamental concepts of excellence model (EFQM ®)

> …choice of a value discipline shapes the company's subsequent plans and decisions, coloring the whole organization, from its culture to its public stance. To choose a value discipline… [and] its operating model – is to define the very nature of a company. Operating models are made up of operating processes, business structure, management systems and culture…[and] at the heart of the operating model sits not one but a set of core processes that make or break an organization's ability to create unsurpassed value at a profit (Treacy & Wiersema, 1995, p. 32).

The organizational product or service does not have to be the same but across companies and organizations adhering to the same value discipline, similarities should be apparent in their operating models.

The role of innovation is briefly mentioned in the product excellence value-driven operating model. If creativity and innovation are characteristics of successful organizations, then examining the role of creativity within the context of a firm's perceived choice of value discipline would be useful in helping managers, leaders, and employees ascertain where the efforts to enhance creativity and innovation can be focused to obtain market leadership.

Performance

Research studies rooted in psychoeconomic theory have shown promise in terms of economic performance measures related to creativity. Psychoeconomic theory conceptualizes creativity and innovation as investments, whereby creative individuals "buy low and sell high" (Lubart & Sternberg, 1995). Economic value that can be measured, sacrificed, or exchanged (Runco, 2004) related to the access of new, external knowledge may have particular merit in theorizing external influences on performance.

Studies of organizational absorptive capacity (ACAP) defined as the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends requires competitive knowledge about revenue, business development, competition, and financial reporting firms often neglect, but as the founders of this theory suggest, a firm's capability in obtaining this knowledge is critical to the firm's innovative capabilities as well as a function of the firm's prior knowledge (Cohen & Levinthal, 1990; Zahra & George, 2002). "Significant relationships between ACAP and innovative outcomes [pertaining to the creation of] a competitive advantage" (Cohen & Levinthal, 1990, p. 185) have been shown suggesting a relationship among values, creativity, and performance. Before information enabling ACAP analysis can be a component of HRD's approach in measuring and integrating creativity into the realm of HRD actions, baseline information regarding the relationship of creativity and performance is necessary to begin the process of identifying specific relationships of factors. In this study, annual architectural revenue ranking by tier explores an initial connection between creativity and performance to begin to connect creativity to the bottom line and profitability.

Productivity and Performance

"Measuring creative performance is notoriously difficult" (Kratzer, Leenders, & van Engelen, 2006, p. 98). Creative performance has been measured primarily by testing and rating activities in experimental settings (p. 96); measuring creativity, values, and performance in architectural practice challenges study designs inviting alternative avenues for assessing influences of creativity and its relationship to productivity and performance.

Values influencing creative productivity by individuals in a firm may induce a moderating effect on performance (Eskildsen et al., 1999). Locating creativity in persons and environments producing creative performance and understanding employee choice of value discipline may indicate organizational value models directed toward market leadership. Kratzer, Leenders, and van Engelen (2006) found polarity in the early stages of R & D team efforts positively influenced creative performance, but in later production or development phases the same polarity negatively impacted creative performance (p. 96). These findings echo practitioners' experiences with creativity as a component of earlier exploratory phases of problem seeking. Team polarity at the conceptualization phases was inversely U-shaped; as conflict escalated, creativity decreased at a certain point as the degree of product and process changed suggesting further research to examine the influence of more detailed items to capture participant disagreement causing polarity.

HRD Performance Models

The second domain of HRD, organizational performance, also known as Human Performance Technology (HPT), combines theoretical underpinnings from systems

theory, behavioral psychology, and knowledge management. In Gilley et al.'s (2001) summary of performance characteristics, the authors focused on what people need to do with skills and knowledge as a means to an end; further, analysis is process-oriented versus event-oriented as well as reactive and proactive. The approach is open to multiple solutions of which training may be a part, partnering with the client to complete front-end assessment. Measures for success are based on quantifiable performance change having operational impact (p. 68).

HPT, as a process, references models aimed at the improvement of organizational efficiencies and the identification of complex causal relationships within the organization. The definition of HPT by the International Society of Performance Improvement is "a systematic approach to improving productivity and competence [in organizations], through a process of analysis, intervention selection, and design, development, implementation, and evaluation designed to influence human behavior and accomplishment" (ISPI, 2000, n. p.). Diverse and continually developing models of HPT emphasize a variety of systematic approaches to performance management (i.e., Mager & Pipe's model (1984) focusing on situation; and Gilbert's model (1978) on comprehensiveness). "HPT…addresses…situations in a systematic, performance-focused, and data-driven" manner (Rummler & Brache, 1992, p. 42). Deterline and Rosenberg's model referenced in Gilley (2001, p. 109) identifies perceived gaps by collecting data on what is desired and what in reality is the way the organization is currently functioning; however, other versions of the HPT model (i.e., the Human Performance Enhancement model by Rothwell, 1996) focus attention on internal and external factors affecting the organization.

Creativity and strategies to reinforce organizational creativity are not addressed in HPT models. Rather, baseline relationships identify elements needed to strategize change management prior to focusing on organizational performance outcomes. Once factors influencing the relationship of creativity, value, and performance are identified, performance analysis may be of interest to architectural firms to operationalize areas of practice where organizational creativity can leverage performance and market leadership. In this study, the identification of environmental support and consequences considers aspects of traditional HPT models, including *causal analysis* but does not include *intervention selections* or *change management.*

HPT continues to evolve enlightening an enormous opportunity to influence creativity in organizations by serving as the central focus of desired change to close a gap and in refining elements of the workplace (e.g., improving job satisfaction). The process of expanding this knowledge could provide an important source of stimulation for creativity (Gilley et al., 2001) with organizational creativity a way to provide differentiation in the marketplace. The transition from conceptualizing employees as expenses to employees as investments has been noted in the HRD literature and HRD's approach has been captured in models related to performance in the system. Linking creativity and values to the financial conceptualization of performance has been suggested by the psychoeconometric research but has yet to be operationalized in practice.

Productivity Measures

Architectural firms track productivity in two ways; monetary value in terms of financial profitability and affective value influencing the way in which the firm

accomplishes its work. While financial value is the prime measure employed, affective value has the power to influence organizational learning by stimulating actions creating meaning. Comprehending the meaning of organizational experiences allows individuals to experience transformative change necessary to incorporate new ideas, thoughts, and values (Mezirow, 1990).

Financial value. Monetary measures, such as net revenues per total staff, or fee dollars per staff, generate a picture of productivity, whether total staff is defined as all staff or limited to principals and technical staff. Profit is measured in terms of *net profit on net revenue* where profitability is measured before distributions of profit, bonus, or other discretionary distributions; *net profit on net revenue* may also be calculated after distributions or calculated on *net profit on total revenue per gross distributions*, either before or after distribution. These measures are offered as ways to compare points in time, work back logs and staffing levels (Birnberg, 1999).

Affective value. The way business is carried out in practice is influenced by beliefs such as creative self-worth, the supportive nature of the work environment, and the attitudes people portray toward their work, peers, clients, and management. Instilling a sense of affective value within organizations creates transformation within a group context with individuals expressing greater confidence in their connectedness with others (Taylor, 1998).

Diversity of measures. "It is actually very difficult to determine the productivity level of design office staff" (Birnberg, 1999, p. 59). One firm hired a neuroscientist to study the neurological effects of lighting, sound, orientation, and architectural design in health-care environments to apply findings to maximize patient recovery and workplace

productivity as an outcome of practice (Ostroff, 2008). Green and sustainable building approaches offer opportunity to quantify the effects of a building design on energy efficiency and resource conservancy through the Leadership in Energy and Environmental Design (LEED) project certification process. Data collected and documented throughout a project help firms track their profitability. Design firms and product manufacturers have used research to document different dimensions of workplace value including satisfaction, productivity, innovation (Herman Miller, 2011), and creativity as well as documenting the process and use of research methodologies such as narrative and mental modeling (Budd, 2000). However, few studies of practice have examined the relationship of creativity to performance.

Practice

Architecture, described as a creative domain, offers an environment described by architects in practice, as both creative and not creative (Blau, 1984). Creativity has therefore been expressed in various domains in different ways (Runco, 2007) and domains, according to Csiksentmihalyi (1996), provide the best evidence of human creativity, with domains helping or hindering creativity (p. 38). A structured domain makes it possible to identify boundaries necessary to empirically study and compare domains.

Architecture's practice roots evolved from craft in the mid 1800s, in the U. S., to a profession in the 1900s, although the presence of 'architecture' is certainly evident in earlier time periods and across other continents. The 'educated' architect referenced their tour of Europe, generally undertaken by young males from wealthy families. Craftsmen and apprentices learned the trade of architecture in master studios after the European

tradition of the atelier system. In this system of training, generally derived from attending L' Ècole des Beaux-Arts, small groups of students undertook a competition under the tutelage of a master architect who provided critique and method; the master was typically an established architect with commissions from wealthy patrons. The apprentice learning process involved observation and replication of ways of doing work. Social camaraderie, long charrettes, and memorable traditions characterized the atelier atmosphere.

Contemporary architectural practice in large firms may have begun through this very same process. "Most design firms begin with one or two principals breaking away from an established practice with one or more initial clients" (Birnberg, 1999, p.5); others followed and the firm followed a fairly typical growth pattern of organization, growth, stagnation and decline.

> "Few principals objectively evaluate the patterns of growth or stagnation in their firms…through research data assembled from design firm financial surveys, a profile of the typical life-cycle of a design practice has been developed… measur[ing] common values of growth –typically fee levels, profits [productivity], staff size, services, geographic influences by the number of years the firm has been in existence…" (p. 4)

In large scale firms, growth is based upon successful market and business development as well as merger and acquisition to expand services and clients. Stagnation can also mobilize growth models, requiring senior principals and partners to actively plan, organize and market (Birnberg, 1999, p. 6).

The organizational structure of firms stemming from the atelier model varies from studio, department, and matrix systems of management with less experienced employees learning from more experienced. Creative design responsibilities are typically assigned to

the project designer role (either architect or interior designer, depending on project scope). And some firms have purposely hired *design architects* to enhance the element of creativity in projects (e.g., Ellerbe-Beckett, CannonDesign).

Architectural Firms: Change Facilitators in a Dynamic Economy?

Bertola and Teixeira (2002) introduced the concept of design as a knowledge process embedded in organizations to foster and promote creativity and innovation. Their study "…[identified] how design activities adapt to different contexts in accessing different knowledge domains…presenting two distinctive ways in which design acts as a knowledge agent; as a 'knowledge integrator' in 'global corporations', and as a 'knowledge broker' in 'local companies' (p. 181). "Knowledge plays an important role inside business innovation… [and] can be defined as an important resource for promoting business innovation" (p. 181). In their conceptualization, "organizational knowledge relates to knowledge embedded in organizational routines, processes, and practices, as well as tacit and explicit knowledge possessed by employees…creat[ing] shared organizational routines that become socially accepted and adopted among its members. This process creates… organizational culture, in which tacit elements – such as core competencies – can eventually be more important in fostering innovation than explicit ones" (p. 182). Activities in which design functions as a knowledge agent at the organizational level included design management, design conceptualization, design strategy, and design policy. Knowledge is accessed by representing abstract concepts through synthetic images, metaphors, and models facilitating the communication of ideas. (Bertola & Teixeira, 2002, p. 186) In this manner creativity, values, and performance become conjoined within tacit promotion of organizational creativity.

The study setting examines a creative organizational context: *architectural design practice.* To this end, the investigation is directed at identifying the components needed to reinforce organizational creativity and their relationship to firm financial performance in achieving a position of market leadership, evidenced by inclusion on a list of top firms. Firms choosing differing value disciplines may in fact operationalize organizational creativity differently. Three assumptions concerning this focus are:

- Creativity may be associated with firms to a greater or lesser extent with choice of the product leadership value discipline, supporting Treacy and Wiersema's (1995) ideas about the adoption of value disciplines.
- Creativity may also surface as a more widespread characteristic of firms required to do creative work (Unsworth et al., 2005).
- While all firms may exhibit creativity to some degree based upon participating staff perceptions, the study anticipates respondents identifying more closely with product leadership or customer intimacy value disciplines and a stronger association with product leadership.

Firms whose primary objectives are intertwined with 'being creative' would seem to have a double-edged sword to contend with in being creative while at the same time employing creativity to drive market leadership. An underlying assumption suggested by Blau (1984) in her inquiry into firm success and failure during the late 70s is that the most successful firms are those that provide creative and stimulating environments, which in turn promote creative people, process, product, and press.

The demand for creativity in terms of the globalized economy, the assumption that all design involves creativity, the need for creative human capital, and the role of creativity in market leadership set the stage to define a new role for creativity in organizations. Florida identifies the distinguishing factor of the creative class as those engaged in work whose function is to "create meaningful new forms" (2002, p. 68);

architects are identified as members of the creative core, fully engaged in the creative process with creativity and innovation called on to embrace shifting work paradigms (Farson, 2008; Florida, 2002; Pink, 2005). The call to 'creativity' has become increasingly familiar as a catch-phrase of corporate, government, and higher education institutions. Although design firms, and specifically architectural firms, are assumed to be engaged in creative and innovation acts, a clear sense of how they operationalize creativity and innovation is missing within and outside the domain.

Creativity and specifically "creative thinking" skills have been identified as important foundational skills at national levels, for example by the U.S. Department of Labor in their descriptions of the skills needed by other disciplines and the National Research Center for the Gifted and Talented (Runco, 1993). In Australia, the Prime Minister's Science Engineering and Innovation Council commissioned a study into the role of creativity in the innovation economy (Prime Minister's Science, Engineering and Innovation Council (PMSEIC) Working Group, 2005) with findings suggesting Australia's R&D and Industry development policies needed to be broadened to include design and creative processes in the definition of research. The Partnership for 21st Century Skills mission is to position U. S. K-12 education by building collaborative partnerships among education, business, and community and government leaders to impact children of the 21st century. Within the context of their 'three R's and 4 C's', the 4 C's encompass: critical thinking and problem-solving, communication, collaboration, and creativity and innovation conceiving these latter skills as an umbrella for other skills (Partnership for 21st Century Skills, 2011; See Appendix A for Creativity and Innovation Skills).

Architectural practice continues to be challenged by its own performance parameters. While design can be seen as a business strategy capable of impacting the bottom line, many firms do not take their own advice to see design as a "process that allows for the intelligent, creative deployment of facilities to bring tangible benefits to organizations" (Bertola & Teixeira, 2002; Brenner & Logan, 2007). Design requires organizational creativity, which in turn requires a work environment supportive of creativity. Shrinking profit margins are contrasted against heightened client expectations as few new market areas for practice surface in the globalized economy. A discipline invaded by other professions including construction management, interior design, landscape architecture, and engineering, architecture practitioners often find their practices at the mercy of economic trends, regional, national, and international productivity and the public's perception of needs. While disasters such as Hurricane Katrina have underlined the importance of architecture's role in the community, fewer young architects are entering practice while at the same time technology is changing practice (de la Llama, 2008).

Diminishing returns and profits experienced in many professions have caused architectural practitioners to question their chosen career and the way architectural practice is carried out and rewarded (C. Saunders, personal communication, July 10, 2008) in comparison to other 'professions' whose hourly rates are far beyond those of architecture (e.g., law and medicine). Although the practice of architecture has been empirically studied (Cardenas, 2007) from diverse domain perspectives (e.g., sociology, Blau, 1984; psychology, MacKinnon, 1965; Dudek & Hall, 1991; American studies,

Quinn, 2007), explorations of creativity in architectural practice are not evident in the architecture or design research literature.

"The gap between design and the social sciences remains huge … [with] … the social scientist's interest in evidence-based design leading designers to fear that their creativity may be stifled" (Forsman, 2008, p. 203). Identifying how work environments either inhibit or enhance creativity has been the focus of Amabile et al.'s (1996) proprietary research with the Center for Creative Leadership[6] (CCL) and focuses primarily on identifying the level of creativity in an organization's work environment. Architectural practice, assumed to be a creative domain, may demonstrate a minority of time spent in creative endeavors with creative and innovative pursuits undertaken by a few, as noted in Blau's study (1984). In her comparative longitudinal study of architectural firms in Manhattan,

> …architects' view of their profession largely relate[d] to the mystique of artistic creativity, and resonate[d] with the opinions of top designers…Of the architects interviewed [from 152 offices, N = 400+], 98% mentioned creativity as the distinctive feature of architecture when compared to other professions…When [architects were] asked to describe the most important and positive aspect of their work, only 38% mentioned anything…related to creativity. …In response to what they would like to change about their jobs…80% answered…more opportunities to be creatively engaged" (p. 49).

This paradox remains alive and well according to new entrants to the profession; "while creativity was the focus of many jury critiques, in practice very little in the way of creativity was demonstrated on the job" (anonymous, personal correspondence, 21 June 2008). Students believe that creativity is a primary skill required in practice, only to discover that in practice, their association with creativity is limited. In *Architectural*

[6] The CCL focuses on leadership education and research and the development of creative leadership to solve organizational challenges.

Record's two-part series focused on lessons from the best-managed firms, the authors found "architecture [as] a creative, quality driven, problem-solving practice" (Kolleeny & Linn, 2002, p. 6)…that suffers from the adage of 'work til you're done' which finds it roots in the design charrette model (p. 4) in which designers engage in creative problem-solving and design until a solution is apparent.

HRD Opportunities in Architectural Practice

Architectural Record (Kolleeny & Linn, 2002) conducted a survey of 52 firms, categorizing 35% as small (1-19 persons), 20% as medium (20-49 persons), 20% as large (50-149 persons) and 27% as extra-large (150+ persons). Included in Part 1 of their survey was factual information about the firm with Part 2 encompassing narrative questions eliciting perceptions related to scale of practice. The percentage of the firm's budget allocated to Finance and HR combined was the lowest of all allocations reported, between 1 and 10%. For all firm sizes, the role of HRD would appear to address traditional benefits and personnel issues rather than facilitating organizational strategy and change management (Gilley & Gilley, 1998) to achieve market leadership. Clearly higher level HRD functions have not entered the realm of architectural practice; given declining revenues and commissions, firm management could clearly benefit from strategic HRD in architectural practices.

According to Chermack, Lynham, and Ruona's (2003) analysis of the critical uncertainties having the potential to impact HRD, the following "uncertainties" can be identified as impacts to architectural practice, especially in larger firms:

- competition for the expertise of elite individuals considered to be of high value;
- implications of globalization (greater competition for knowledge);

- individualistic workforce creating the need to develop custom training;
- knowledge management, moving from the information age to the conceptual (Pink, 2005) or the participation age noted by McLagan and Nel's research (as cited in Chermack et al., 2003); and
- change related to the rapid escalation of e-technology.

"A company's most important asset …is creative capital, or the arsenal of creative thinkers whose ideas can be turned into valuable products and services…professionals whose primary responsibilities include innovating, designing, and problem-solving – the creative class – make up a third of the U.S. workforce" (Florida & Goodnight, 2005, p. 125). However…despite such insights and advances, most businesses have been unable to pull … notions of creativity together into a coherent management framework (p. 126).

Conceptual Framework

The conceptual framework (Figure 4) for this research study reflects constructs originating from the literature and practice influencing the relationships among organizational creativity, organizational values, and organizational excellence. The foundation for the *creativity* measures considered multiple sources:

- factors of the creative work environment (Amabile et al., 1996);
- Woodman et al.'s (1993) conceptual framework for organizational creativity in complex social settings;
- Majaro's (1991) 8-point model for managing ideas;
- Haynes et al.'s (1999) scales[7] for autonomy and control, feedback, leader support, peer support, and work demands;
- Hunter et al.'s (2007) meta-analysis of studies assessing the relationship of climate dimensions predicting creativity; and

[7] Adapted from "Measures of perceived work characteristics for health services research: Test of a measurement model and normative data" by C. E. Haynes, T. D. Wall, R. I. Bolden, C. Stride, and J. E. Rick, 1999. *British Journal of Health Psychology, 4,* pp. 273-275. Copyright 1999 by Wiley-Blackwell. Adapted with permission.

- Damanpour's (1991) meta-analysis of effects of moderators and determinants of organizational innovation.

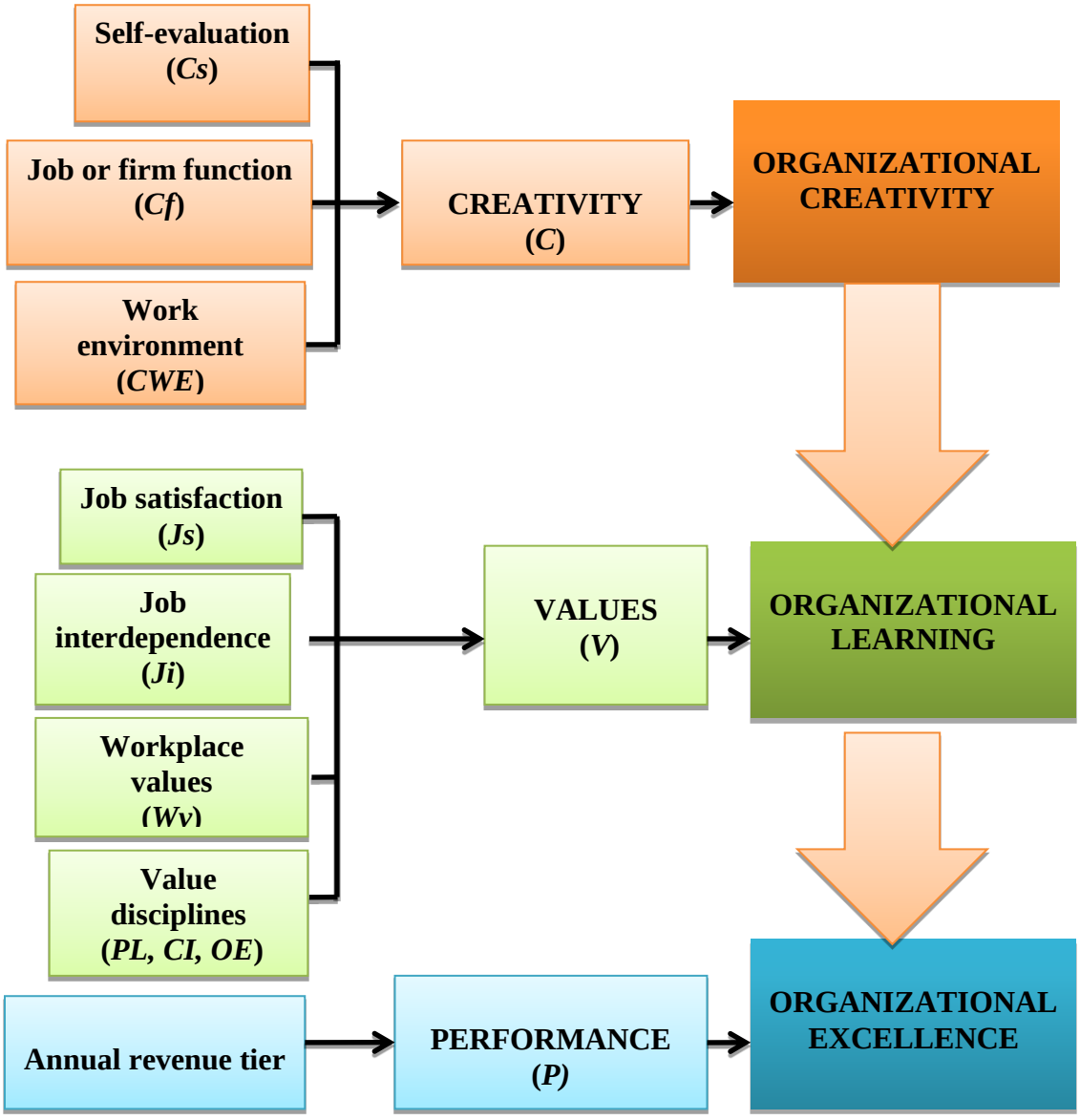

Figure 4. Conceptual framework examining factors related to organizational creativity, organizational learning, and organizational excellence (Leigh, 2010)

An individual measure of creativity was included to assess creativity at the 'person' level, the creativity measure for job or firm was used to examine perception of creativity as a component of the business processes. The creative work environment index addressed the influences of the social and psychological environment as identified by Rhodes (1987) as press.

Productivity in practice is analyzed in terms of tier ranking to examine potential relationships to creativity. Measures for *values* were derived from multiple sources. An individual measure of job satisfaction addressed the 'person' response, Van Dyne et al.'s(1994)[8] measures addressed workplace values, Dean and Snell's (1991)[9] measures for job interdependence measured team work and choice of value discipline to achieve market leadership (Treacy & Wiersema, 1995) was developed to evaluate the connection to the product leadership value discipline. A productivity measure embedded in the creative workplace index also addressed productivity.

Performance encompassed annual revenue tier broken into three levels by revenues generated from architectural services.

HRD research, shaped by tensions surrounding level of measures, theoretical development and value considerations, may enrich the inquiry into organizational creativity and its relationship to organizational learning and organizational excellence. Although several meta-perspectives to build HRD theory have been proposed (McGuire et al., 2007)--language, systems, community/societal and psychological--the systems

[8] The measures for "Perceived importance of workplace values" by L. Van Dyne, J. W. Graham, and R. M. Dienesch, in *Taking the measure of work: A guide to validated scaled for organizational research and diagnosis* (p. 284), by D. L. Fields, 2002, Thousand Oaks, CA: Sage Publications, Inc. Copyright 2002 by Sage Publications, Inc. Adapted with permission.

[9] The measures for "Job uncertainty, complexity, variety, and Interdependence" by J. W. Dean and S. A. Snell, in *Taking the measure of work: A guide to validated scaled for organizational research and diagnosis* (pp. 101-102. 284), by D. L. Fields, 2002, Thousand Oaks, CA: Sage Publications, Inc. Copyright 2002 by Sage Publications, Inc. Adapted with permission.

perspective recognizes the importance of achieving best fit at the organizational level, and thus seems suitable for this study. A firm's ability to value, assimilate, and apply new knowledge is predicated upon its creative performance, choice of values, and ability to learn, portraying the systemic view of HRD.

Few theories capture a speculative model to explore the relationship of creativity, values, and performance.

> [A] capability-based approach… assume[s] that organizations learn naturally as they respond to change, no matter what the conditions …[and] assumes that no one form of learning is superior over another. To improve learning, an organization must discover, affirm, and enhance …current patterns of learning. Leaders need to identify those patterns so that they can make informed decisions about what to learn, who should learn it, and when and where learning should happen. These approaches are not proactive and "unfold as journeys of discovery" in which consultants and leaders guide the company to uncover insights into the kind of learning that is the best (How do organizations learn? n.d.)

Focusing on creativity in the work setting and its potential for association with the constructs of values and performance, may identify directions firms can take to enhance and leverage creativity.

A framework encompassing new relationships influencing organizational climate and the learning culture of architectural practice would be a welcome addition to the body of literature focusing on creativity theory. Until theory reaches the level of practitioners' understanding through application, research into creativity in the work environment lacks transformation from theory into practice potentially making a difference in performance.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

This research explored creativity in large scale architectural practices in the U. S. As a cross-sectional, nonexperimental study, data were collected using an electronic survey comprised of 91 items (see Appendix B) delivered through an online survey service. Participants were given one open-ended question to enter additional comments at the end of the survey. A between-groups factorial design was used to collect data and examine relationships among the constructs of creativity, values, and performance.

In seeking responses from employees of architectural firms, electronic surveys were considered faster and a better fit to maintain anonymity, providing ease of use, and attention to the time demands of respondents common in this domain. Use of an electronic survey was also an appropriate choice for a study seeking to collect perceptual information about organizational creativity from a potentially large number of participants (Orcher, 2005, p. 36) and from a postpositivistic perspective, to collect empirical observational data to verify and build theory (Creswell, 2003, p. 6).

Population

The target population was large architectural firms with staffs of 60 to several hundred employees, exhibiting the range of positions and functions paralleling those typically found in practice. While each 'firm' presents a creative organizational environment not all employees may be directly engaged in the creative process. The projected sample including design and non-design staff was estimated as $N = \geq 100$ but

this projection is unbounded, with responses dependent upon timing during a recession, communication by the principal, and choice by employee (Kolleeny & Linn, 2002).

Sample Selection

Firms with revenues generated only from architecture services resulted in 109 firms[10] selected from the 2009 *Architectural Record* List of Top 250 Firms; controlling for service type (i.e., architecture only) increased commonality in design process procedures, service delivery, and project outcome. Self-reported annual revenues ranged from $3.72 to $695.10 million. A stratified random sample of 30 firms was drawn from the 109 firms to create three tiers; 10 from the top third (Tier 1), 10 from the middle third (Tier 2), and 10 from the bottom third (Tier 3). For this sample, the architecture revenue ranges were:

- Tier 1: $32.00 to 549.95 million
- Tier 2: $18.00 to 32.00 million
- Tier 3: $4.65 to 17.90 million

Initially, 15 firms were selected but with a fluctuating economic environment, the decision was made to double the sample number from five to ten from each tier (total firms = 30) when issues in the economy potentially impacting architectural services were considered (e.g., the Architectural Billing Index reaching record lows, slowing of work in firms resulting in layoffs, firm closures, a general environment of unease, and the uncertainty of how the request to participate would be received). Firms in each tier were treated as a group; representing a variant on cluster sampling.

Firm locations for the sample reflected geographic distribution by state and are close to, if not in, major metropolitan areas. Firm distribution of the sample reflected

[10] One hundred and forty-one firms were excluded as offering services including engineering or construction.

representation similar to the location distribution of all firms in the top 250 as shown in Table 4. Consistency in practice focus and work tasks in large scale urban practices should assure perceptions about practice not influenced by geographic location. No other actions were taken to ascertain geographic representation.

Table 4
Firm Distribution by State and Representation in the Study[a]

State	FIRMS			
	By state in listing (#)	By state in listing (% of 250)	By state in sample (#)	By state in sample (% of 109)
California	35	28	6	23
Florida	8	3	1	3
Georgia	11	4	1	3
Illinois	14	5	1	3
Maryland	5	2	3	10
Massachusetts	12	5	4	3
Minnesota	6	2	1	3
Missouri	3	1	1	3
Nevada	1	-	1	3
New York	22	8	3	10
Ohio	12	5	2	6
Texas	21	8	3	10
Virginia	7	3	1	3
Washington	4	1	1	3
Wisconsin	5	2	1	3
Other states	84	33	-	21
TOTAL	250	100%	30	100%

[a]From 2009 Architectural Record's Top 250 Firms

Design and non-design staff representation were included in the sample to compare creativity measures across groups by job role or position. While larger sample sizes are less subject to random sampling error, the desired sample size for this study could have varied based on the number of registered architects practicing in large firms, architects practicing in the U. S.[11] (101,630[12]) and membership in AIA (86,000). Large sample sizes of several hundred respondents were reported by other researchers conducting research within large non-design organizational settings (Amabile et al., 1987, 1990, 1995; Unsworth et al., 2005).

[11] According to the Bureau of Labor Statistics, 17-1011 Architects, Except Landscape and Naval , May 2009
[12] Excluding self-employed individuals, Bureau of Labor Statistics, 17-1011 Architects, Except Landscape and Naval, May 2009

Administration Plan

After selection of the firms, the principals were identified by looking on a firm website or using the AIA online membership directory. The appropriate principal and correct mail addresses were confirmed by phone to ascertain an appropriate decision-maker had been identified prior to contact. An introductory recruitment letter (Appendix C) to the key principal(s) was mailed on university letterhead in late November 2009, upon receipt of institutional research approval, explaining the study's objective, importance, and implications and inviting the firm's participation of the staff in the research project. Follow-up discussion(s) by phone focused on answering questions, articulating the schedule, reviewing directions for viewing the survey online, and affirming the request for a project summary at the conclusion of the study.

When arrangements for survey distribution to staff had been made with the principal, the principal received the staff invitation text with URL by E-mail (Appendix D) and the reminder text (Appendix E) for distribution at the end of week 1 and 2 reminding staff to complete the survey. A start date was established with each principal, and once evidence of surveys being accessed by staff members was apparent, the researcher called or e-mailed the principal to remind them to send reminders. The survey remained opened for a 12 month period, although participants were told the survey was no longer accessible after three weeks; the survey site was open from December 2009 through November 2010.

Inclusion and Exclusion Plan

Firms without capabilities to electronically respond would have been excluded as well as firms uncommitted to the project with no replacements selected. Commitment to

participate was received by e-mail or verbal consent by the principal. Based upon conversations with various architectural practitioners who reviewed the survey in hard copy and electric form, anonymity was important to the participants to encourage candidness in responses. With direct URL access, respondents' anonymity remained assured through the duration of the study.

Response Rate

Firms electing to participate in this study were fewer than initially projected due to economic conditions and therefore an N = +/-100 would be appropriate (Orcher, 2007, p. 47). The survey required endorsement by a firm's principal as gatekeeper and it was assumed creativity would be of interest to firm employees, presenting challenges to calculating the response rate based on fluctuating staff numbers and little control over who received the invitation to participate. With this in mind, emphasis was placed on quality of response over rate of response. No incentives were offered.

Non-response bias. Non-response was tracked by examining access to the survey which did not have responses to the majority of questions.

Refusal to participate. Accessing the survey offered the option to opt out of participation at the beginning. The survey provider did not offer options to identify reasons for refusal.

Post Contact

After the survey period closed, e-mails were sent to each principal thanking them for their firm's participation and letting them know data analysis was being conducted. A study summary will be sent to each principal upon completion of the dissertation with

sponsor recognition certificate identifying these firms as *organizations concerned with creativity.*

Instrumentation

A paper pre-test was conducted with thirty-two interior design seniors enrolled in an interior design capstone class, the majority of who had completed professional internships in design practices. They were chosen for familiarity with the issues occurring in a design work environment (e.g., time pressure, physical place, support, and productivity), understanding of terminology, and investment in creativity. Correlations and multiple regression analysis of the pre-test data evidenced association and subsequent loading on single factors with good model fit.

Multiple revisions were made to the survey for syntax and format to increase understanding; the final survey appearance was altered in its electronic form (Appendix B) when loaded and finalized through the survey provider. Accessing the URL took the participant directly to the survey welcome screen with the following message:

> Thank you for participating in this survey! I am collecting information about creativity and performance in architectural practice; your contribution along with that of others will enable me to look at relationships among these factors and apply the findings to practice. I value your time and attention in helping me to achieve this goal!
>
> As you take the survey and answer the questions, the survey structure will not allow a return to previously answered questions.

The consent screen invited participation, introduced the context of the study, described the procedures, and explained risks and benefits, confidentiality and voluntary nature of the study. The next screen provided contact information followed by the choice to participate or opt out.

Scale Development

The body of the survey was comprised of three parts – Part 1 included demographic measures; Part 2 included 5-point Likert scale ratings of agreement for items related to the three organizational value disciplines; and Part 3 included 5-point Likert scale ratings of agreement for items characterizing factors of the creative work environment, workplace values, and job interdependence.

Scales for the value disciplines for *PL, CI* and *OE* in Part 2 were developed by the author based on an examination and understanding of components of the value disciplines for market leadership outlined by Treacy and Wiersema (1995, pp. 52, 90, 130). Scales in Part 3, for *leader support and feedback, positive interpersonal exchange, freedom,* and *workload demands*, were adapted from instruments used by Haynes et al. (1999), with permission of the authors (Appendix G). Instruments published in Fields (2002) were adapted with permission for *workplace values* using Van Dyne et al.'s (1994, p. 284) instrument and measures for *job interdependence* developed by Dean and Snell (1991, pp. 101-102). Measures for *job satisfaction, organizational encouragement, intellectual stimulation, sufficient resources, challenging work, organizational roadblocks, creativity,* and *productivity* were developed by the researcher after reviewing factors used in previous research studies (Appendix I).

Variables

The variables in this study defined characteristics of participants and their attitudes toward their work environment. Table 5 lists each variable indicating role and characteristics (level of measurement and number of response options). Demographic variables asked respondents to choose one response from a list of categories and were

treated as nominal or ordinal when ranking was apparent. As a nonexperimental design, the term *predictor* variable is used to describe variables was used to predict or explain (independent) values of other variables; *outcome* variable was used to describe effect or response (dependent) variables. In some instances, variable roles were interchangeable based on the question asked (e.g., *PL, CI, OE,* and the creativity variables for *Cf* served as either predictor or outcome variables) in exploring the relationship of creativity to value discipline.

Part 1: Demographic Information (14 items): *firm name, tier, position with the firm (job role), years with firm, gender, degree of creativity/CS, degree type, institution awarding degree, years in full-time practice after receiving first professional degree (architectural/design staff) or years of work experience (non-design staff), experience in market sector, professional affiliations, professional registrations/certifications, work satisfaction (Js), and range of annual income;*

Part 2: Organizational Value Disciplines (9 items/3 factors)--three items each combined to construct factor indices as follows:

- Customer intimate/CI: Add values for *items050, 051 and 054*
- Product leadership/PL: Add values for *items048, 052 and 053*
- Operational excellence/OE: Add values for *items049, 055 and 056*.

Part 3: Organizational Environment (70 items/13 factors): *organizational encouragement/Oe* (5), *intellectual stimulation/Is* (5), *leader support and feedback/Ls* (5), *positive interpersonal exchange/Pi* (5), *sufficient resources/Sr* (5), *freedom/F* (5), *challenging work/Cw* (5), *workload demands/Wd* (5), *organizational roadblocks/Or* (5), *creativity/C* (5), *productivity/P* (5), *job interdependence/Ji* (5), *workplace values/Wv* (10).

Table 5

Predictor and Outcome Variables, Scale, and Level of Measurement

Item #	Variable	Predictor Variable	Outcome Variable	Scale	Levels
002	Position	X		nominal	17
003	Tier	X		ordinal	2
004	Years with firm	X		scale	7
005	Gender	X		nominal	2
006	Creativity self-evaluation	X	X	ordinal	4
007	Degree/education	X		ordinal	11
008	Years in practice	X		scale	9
009	Years in work (not design professional)	X		scale	8
010-027	Market segment experience	X		nominal	18
028-038	Professional memberships	X		nominal	11
039-045	Registrations/certifications	X		nominal	7
046	Satisfaction with work (*Js*)	X		ordinal	4
047	Income range	X		scale	6
048-056	Value discipline (*Vd*)	X	X	scale	5
057-061	Organizational encouragement	X		scale	5
062-066	Intellectual stimulation	X		scale	5
067-071	Leader support and feedback	X		scale	5
072-076	Positive interpersonal exchange	X		scale	5
077-081	Sufficient resources	X		scale	5
082-086	Freedom	X		scale	5
087-091	Challenging work	X		scale	5
092-096	Workload demands	X		scale	5
097-101	Organizational roadblocks	X		scale	5
102-106	Creativity	X	X	scale	5
107-111	Productivity	X		scale	5
112-116	Job interdependence	X		scale	5
117-126	Workplace values	X	X	scale	10
127	Customer intimacy value discipline index (*CI*)	X	X	scale	-
128	Operational excellence value discipline index (*OE*)	X	X	scale	-
129	Product leadership value discipline index (*PL*)	X	X	scale	-
130	Organizational encouragement index (*Oe*)	X	X	scale	-
131	Intellectual stimulation index (*Is*)	X	X	scale	-
132	Leader support and feedback index (*Ls*)	X	X	scale	-
133	Positive interpersonal exchange index (*Pi*)	X	X	scale	-
134	Sufficient resources index (*Sr)*	X	X	scale	-
135	Freedom index (*F*)	X	X	scale	-
136	Challenging work index (*Cw*)	X	X	scale	-
137	Workload demands index (*Wd*)	X	X	scale	-
138	Organizational roadblocks index (*Or*)	X	X	scale	-
139	Creativity index (*Cf)*		X	scale	-
140	Productivity index (*P*)	X	X	scale	-
141	Job interdependence index (*Ji*)	X	X	scale	-
142	Workplace values index (*Wv*)	X	X	scale	-
143	Creative work environment index (*CWE*)	X	X	scale	-

Sample items for Part 3 included:

- *Organizational encouragement:* developed by the researcher based upon review of published instruments
    - *Sample item:* People are allowed to fail if they did their best

- *Intellectual stimulation*: ranked number two in Hunter's et al. (2007) meta-analysis
    - *Sample item:* The firm encourages continuous professional development through learning.

- *Leader support and feedback*: adapted with permission from Haynes et al. (1999) feedback and leader support scales; ranked fourth in Hunter's et al. study (2007)
    - *Sample item*: Project managers/supervisors encourage project staff to give their best effort.

- *Positive interpersonal exchange*: adapted with permission from Haynes et al. (1999) peer support scale; ranked first in Hunter's et al. study (2007)
    - *Sample item:* Members of the firm challenge each other's ideas in a constructive way.

- *Sufficient resources:* ranked twelfth Hunter's et al. study (2007)
    - *Sample item:* Access to resources is not a problem in this firm.

- *Freedom:* adapted with permission from Haynes et al. (1999) autonomy and control scale; while there is controversy over the inclusion of this measure (Rosenberg, 2007), this study will test its inclusion
    - *Sample item*: Staff have freedom to plan their own work.

- *Challenging work:* developed by the researcher based upon review of published instruments
    - *Sample item*: Work in this firm is important and meaningful.

- *Workload demands:* adapted with permission from Haynes et al. (1999) work demands scale
    - *Sample item:* There are conflicting demands on people's time.

- *Organizational roadblocks:* developed by the researcher based upon review of published instruments
    - *Sample item:* People are too critical of new ideas in this firm.

- *Creativity:* developed by the researcher based upon review of published instruments
    - *Sample item*: This firm produces innovative projects.

- *Productivity:* developed by the researcher based upon review of published instruments
    - *Sample item:* This firm is productive in getting projects completed on time.

- *Job interdependence*: portion of a combined measure developed by Dean and Snell (1991); used with permission as published in Fields (2001, pp. 101-102)
    - *Sample item:* People on my team have to coordinate with other people in the firm.

- *Workplace values*: reduced from 12 to 10 items with wording changes for use in this study; used with permission (Van Dyne et al., 1994) and adapted 5-point Likert scale from original 7-point scale
    - *Sample item:* Individual employees are recognized and rewarded for innovative work.

Socially Desirable Responding (SDR)

For each factor, headings were used with definitions for that factor; Zerbe and Paulhus (1987) found responses to statements presented in this manner may be contaminated by impression management. Given the survey format (see Appendix B), the potential for misunderstanding of meaning, length of the survey, and intended population, headings were used for definition. To control for interaction effects where a focus on creativity may have a joint effect from responses to items, a self-evaluation of creativity (*Cs*) was used and correlated for association with creativity of the job or firm (*Cf)* and the creative work environment index (*CWE, items 057-111*). This may be a consideration in architectural practice as people may desire, aspire, or attribute the quality of creativity to themselves. To control for spuriousness, correlations were examined and shared variances using simple linear regression were computed. Because the nature of the study is exploratory, no other measures of control were incorporated.

Level of Measurement

In the creativity research literature, confusion over level (individual, group, or organizational) is attributed to the nature of constructs and the interchangeability of terms (creativity and innovation; creativity and organizational innovation). The level of measurement was clarified by statement wording (Klein, Dansereau, & Hall, 1994) to avoid confusion in testing conformity of the data and examining causal relationships. Two group levels were addressed (see Table 6): aggregated firm with all respondents and firms grouped by performance tier. The wording for certain measures was adapted from existing measures to improve fit with group level item syntax. This approach to measurement level (Table 6) is appropriate when focusing on organizational creativity.

Table 6
Level of Measurement

Assumption	Level of theory	Level of measurement	Level of statistics
Within group agreement (homogeneity)	Firm	Group: individual aggregated	Descriptive
Between group agreement (independent)	Organizational	Grouped Firms	Correlation

As noted in the study delimitations, data collected across a single industry may minimize observed differences if organizations are homogeneous with respect to variables of interest (Klein et al., 1994, p. 210); cross group comparisons were examined by tier rank to see if there are differences in variables of interest (e.g., years with firm, years in practice, creativity, creative work environment).

Reliability

Items in the survey modified from earlier instruments where reliability was confirmed for the original instrument require re-establishment of reliability despite potential for convergent reliability. Exploratory Factor Analysis examined relationships among measures used for value discipline indices and the creative work environment

factor indices. For each new index, Pearson's product moment correlation examined strength of association followed by computation of Cronbach's alpha to examine internal consistency.

Validity

Content and Face Validity

Measures were reviewed by both domain specific experts as well as methodological experts prior to data collection to clarify content and meaning. The pre-test conducted with seniors in interior design clarified language and syntax.

Convergent Validity

Factors combined to create indices were examined using Exploratory Factor Analysis for *CWE* and *Vd* to test overlap and similarity of constructs before performing analyses of the data.

Construct Validity

To evaluate how well the variables were operationalized, Pearson's correlations were computed to confirm relationships; calculating Cronbach's alphas confirmed internal reliability.

Internal Validity

While this is not an experimental study, participants could manifest a more heightened awareness of creativity-related factors in turn affecting their responses. While there was little control over participants talking about 'creativity' after the survey and advancing a diffusion effect to others and no confirmation of responses completed individually, the survey was only available once to a terminal, and responses could only be advanced forward – no capability was provided to return to a response. Once a

respondent paged through the survey, they were required to either complete or terminate the session.

External Validity

Study findings were enhanced by having drawn a stratified random sample of (Huck, 2008, p. 106) allowing generalization to large firms outside the sampling frame with organizational activities similar to those of large architectural firms; this information could be useful to the AIA Large Firm Roundtable and to the AIA in general regarding the role of creativity in large firm practice.

Statistical Conclusion Validity

The data collection method met assumptions to minimize weakened findings; data were checked for skewness and low cell counts to ascertain assumptions required for specific statistics and effect sizes computations to determine practical significance,.

The protocol for this study was reviewed by the Research Integrity and Compliance Review Office's Institutional Review Board (IRB) at Colorado State University and determined to be in compliance with NIH CFR 46 and the federal regulations governing review of research involving human subjects (Appendix D).

Approach to Data Analysis

The study design, grounded in a postpositivistic perspective, collected empirical observations to build theoretical modeling (Creswell, 2003, p. 6) for organizational creativity, encompassing influences on organizational creativity in one type of creative organization, architectural firms.

Data Management

Survey data files were exported in spreadsheet format from the survey site provider at the close of the survey. New values were constructed for items001-047, demographic variables, using numeric values for responses to position, degree type, experience in market segment, affiliations, registrations/certifications; responses for position were collapsed to create more meaningful interpretation. Numeric values for responses to individual measures using Likert scales (items057-126) were directly transferred to an SPSSv.18 data file. A codebook was generated to inspect and correct coding errors (see Appendix K for coding guidelines) in values, measurement level, and information about the variables.

Exploratory Data Analysis (EDA)

EDA was conducted to examine variables for missing data and distribution. Demographic data were summarized to describe characteristics of the sample for position, years in firm and in practice, gender, education, experience in market segments, professional affiliations, registrations and certifications, and income range.

Distribution. Each variable was examined for characteristics of normality by computing the skewness statistic for ordinal and scale variables. Descriptive statistics examined measures of central tendency, variability, standard deviation, independence of observations, homogeneity of variances, and linearity using box plots, scatter plots and histograms to examine variable characteristics. The majority of ordinal and scale variables were found to meet assumptions of approximately normally distributed variables, with five items revealing a moderate skewness from 1.02 to 1.50 (Table 7).

Variances from the mean were examined for these five items and found to be within acceptable ranges:[13]

- Building client relationships requires the best solution to meet client needs
  - one of three CUSTOMER INTIMATE measures;
- Customer satisfaction is paramount in the way clients are managed
  - one of three CUSTOMER INTIMATE measures;
- Members of the firm challenge each other's ideas in a constructive way
  - one of five POSITIVE INTERPERSONAL EXCHANGE measures;
- Employees decide when to take breaks from their work tasks
  - one of five FREEDOM measures; and
- Work quality is important to members of the firm
  - one of five CHALLENGING WORK measures.

Table 7
Variables Demonstrating Moderate Skewness

	N	Min	Max	*M*	*SD*	Variance	Skewness	
							Statistic	Std. Error
Item050 Building client relationships requires the best solution to meet client needs	83	1.00	4.00	1.65	.77	.59	1.03	.26
Item054 Customer satisfaction is paramount in the way clients are managed	83	1.00	4.00	1.70	.76	.58	1.08	.26
Item 073 Members of the firm challenge each other's ideas in a constructive way	81	1.00	5.00	2.39	.82	.67	1.12	.27
Item 083 Employees decide when to take breaks from their work tasks	81	1.00	5.00	1.96	.81	.66	1.35	.27
Item 091 Work quality is important to members of the firm	80	1.00	5.00	1.69	.66	.44	1.50	.27

[13] Used as outcome variables or within composite indices used as outcome variable, small margins allow the assumption of normally distributed values for scale variables.

Outliers. Scores outside the range of the majority of response values can influence models constructed using these variables and were examined, but found to be negligible related to impact with no extreme outliers. The incidence of outliers is noted in parentheses as number of responses above (+) or below (-) the majority of responses.

- *Item129*: Product Leadership Value Index (+2, -4)
- *Item144*: Customer Intimate Value Index (+0, -1)
- *Item128*: Operational Excellence Value Index (+1, -2)
- *Item131*: Intellectual Stimulation (+0, -1)
- *Item132*: Leader Support and Feedback (+4, -3)
- *Item133*: Positive Interpersonal Exchange (+0, -2)
- *Item134*: Sufficient Resources (+1, -2)
- *Item137*: Workload Demands (+0, -1)
- *Item139*: Creativity (+3,-4)
- *Item143*: Creative Workplace Environment Index (+1, -2)

Instrumentation and Analysis

Studies conducted using climate factors supportive of the creative work environment have employed a variety of statistical analyses including correlation, factor analysis, multiple regression, and structural equation modeling to understand the extent and source of influence among variables. Table 8 compares studies employing varied statistics and approaches. Using data collected from a creative domain, the interests of this study were to construct a model of organizational creativity to be used as the foundation for future inquiry into components of the model, and therefore, multiple regression modeling will be conducted (Pedhazur, 1997). Differentiation of variable selection procedures will, in fact, offer modeling alternatives for future investigation.

Table 8

Comparison of Instrumentation, Items, and Statistical Analysis in Creativity Studies

Instrument	# Participants	Variables	Analysis
Siegel Scale of Support for Innovation (SSSI), Siegel & Kaemmerer, 1978	2,153 high school students	Leadership, ownership, norms for diversity, continuous development, consistency	Factor Analysis
Creative Climate Questionnaire (CCQ), Ekvall, 1996; Ekvall, Arvonen, & Waldenstrom-Lindblad, 1983; Isaksen, Lauer, & Ekvall, 1999	192 researchers and 234 engineers	Challenge, freedom, idea support, trust/openness, dynamism/ liveliness, playfulness/humor, debate, conflicts, risk taking, idea time	Factor Analysis
KEYS, Amabile et al., 1996	3,708 employees from 27 organizations	Organizational encouragement, supervisory encouragement, work group supports, sufficient resources, challenging work, freedom, organizational impediments, workload pressures, creativity, productivity	Factor Analysis Multiple Regression
Team Climate Inventory (TCI), Anderson & West, 1998	971 participants	Vision, participative safety, task orientation, support for innovation, plus items from the SSSI and a scale of constructive controversy	Factor Analysis
Work Characteristics Inventory (WCI), Haynes, Wall, Bolden, Stride, & Rick, 1999	9,000 health service employees (825 pilot participants)	Autonomy/control, feedback on work performance, influence over decisions, leader support, role clarity, role conflict, peer support, work demands, professional compromise, job satisfaction, job related anxiety, depression	Confirmatory Factor Analysis SEM
Taxonomy for Creativity, Hunter, Bedell, & Mumford, 2007	meta-analysis of 42 studies	Positive peer group, positive supervisor relations, resources, challenge, mission clarity, autonomy, positive interpersonal exchange, intellectual stimulation, top management support, reward orientation, flexibility and risk-taking, product emphasis, participation, organizational integration	Effect Sizes
Creative Achievement Questionnaire (CAQ). Carson, Peterson, & Higgins, 2005	5 studies: undergrad students	Domains: visual arts, music, creative writing, dance, drama, architecture, humor, scientific discovery, invention, culinary	Correlation Principal components analysis
Eskildsen, Dahlgaard, & Nørgaard, 1999	202 CEOs from European countries	Examines causal relationships: Comparing three methodologies for business excellence with three different levels of learning and the mental process of creativity	SEM
Santanen, Briggs, & De Vreede, 2004	61 four-person groups	Develops a cognitive network model (CNM) to explain mechanisms that give rise to creative solutions in human mind	Literature search and Causal modeling, model testing
Woodman, Sawyer, & Griffin, 1993	theory development	Interactionist model for organizational creativity	Model development

Construct Integrity and Reliabilities

Exploratory Factor Analysis examined construct integrity and internal reliability of the data to inform decisions prior to constructing indices for constructs considered in the study (Agresti & Findlay, 1997, p. 630). EFA was conducted to understand patterns of interrelationships among variables and examine latent constructs; changes made in the adaptation process to accommodate focus, level of measurement and context required composite indices be examined for reliability and validity prior to further statistical manipulation as well as informed by theoretical concerns. Assumptions prior to statistical manipulation included normality, independent sampling and linearity, with moderate correlation among variables (Leech, Barrett, & Morgan, 2008, pp. 58-59); items met these assumptions.

Confirmation was sought for items related to factors attributed to the creative work environment. For this reason, each of five items used to construct each index was anticipated to load appropriately on that factor. In total, the study sought to utilize fourteen indices for value disciplines (3 indices) and the creative work environment (11 indices).

Principal axis factor analysis (PA). Principal axis factor analysis with varimax rotation was used to begin to assess the underlying structure for proposed models. In PA factor analysis, the correlation matrix is modified with correlations of each item with itself replaced with a 'communality' measure of that item's relation to all other items (Morgan et al., 2007, p. 58). In the full model, all factors were requested followed by partial models requesting fewer factors. Findings for models tested are reported in Chapter IV.

Factor analysis specified a full model with three factors for value disciplines and eleven factors for the creative work environment; factor loads < .40 were eliminated to simplify findings. All factors were expected to demonstrate high loadings with minimal cross-loading (< .20) on other factors. Kaiser-Meyer-Olkin (KMO), a measure of sampling adequacy, tested assumptions and a value > .70 ($p \leq .05$) indicated adequate correlations to provide a reasonable basis for factor analysis; eigenvalues above 1.0 were assumed significant for the variance explained. KMO < .50 was considered inadequate (Morgan et al., 2007).

Rotated factor matrices were included in some studies and not in others; this study included rotated factor matrices to determine clustering by items with loadings > .40.

Principal components analysis (PCA). Item loadings for value discipline items were inconclusive and EFA could not be performed; PCA was conducted to ascertain the structure of proposed indices prior to item reduction.

Data Transformation

Composite indices used in multiple regression procedures conducted later in the study required re-coding based on weak loadings and multicollinearity observed during the factor analysis procedures.

Measures of Association

To test relationships between two variables, Pearson chi-square was used to evaluate statistical strength; phi was computed, if there was a statistically significant relationship to evaluate effect size. For ordinal data, specifically 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 (Cohen,

1992). 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 examined. One-sample *t* tests and independent sample *t* tests were also calculated, using the Mann-Whitney *U* test (nonparametic) test for the latter, calculating the effect size for *d.* Finally, one-way ANOVAS or single factor analysis and MANOVAS or multi-factor analysis were used to compare groups followed by the post hoc Tukey HSD Tests to identify specific differences.

Table 9
Alignment of Question, Type, and Test Statistics

Research question	Type	Variable/Indices	Test statistic(s)
Q1: What is organizational creativity in architectural practice?	DESC	Demographics ▪ Position ▪ Years with firm/years in full-time practice ▪ Gender ▪ Educational degree ▪ Market segment experience ▪ Professional affiliations, registrations/certifications ▪ Annual income	Frequency distribution Pearson correlation Pearson chi-square
		Self-evaluation *(Cs)*	Frequency distribution One-sample t-test
		Creativity of the job or firm *(Cf)*	Pearson correlation Cronbach's alpha One-way ANOVA
		Cs, Cf	Pearson correlation Spearman rho
		Creative Work Environment *(CWE)*	Frequency distribution Pearson correlation Cronbach's alpha Principal axis factor analysis (PA)
		Cfr (C 1-5, Oe 1, P1, P5)	Cronbach's alpha
		CWEr (Cfr, Oe, Ls, Is, Cw)	Cronbach's alpha
		Creativity index *(Cs, Cfr, CWEr)*	Cronbach's alpha
		Cs, Cfr, CWEr	Frequency distribution Spearman rho Simultaneous multiple regression One-way ANOVA

			Post hoc Tukey HSD test
Q2: Is there a relationship between value and creativity in architectural organizations? (*V : C*)	DIFF	Workplace values *(Wv)*	Pearson correlation Cronbach's alpha
		Job interdependence *(Ji)**	Pearson correlation Cronbach's alpha
		Satisfaction with work (*Js*)	Frequency distribution
		Wv : Js	Frequency distribution Spearman rho Simple regression/bivariate correlation
		Value (*Js, Wv*) and Creativity (*Cs, Cfr, CWEr*)	Frequency distribution Pearson correlation Simultaneous multiple regression MANOVA
		Value discipline *(PL, OE, CI)*	Frequency distribution Pearson correlation Cronbach's alpha Principal axis factor analysis KMO/Bartlett Pearson correlation Principal components analysis (PCA) Cronbach's alpha
		Value *(PL, OE, CI) : Cs*	Simple regression/bivariate correlation
		Value *(PL, OE, CI) :Cfr*	Simultaneous multiple regression
		Value *(PL, OE, CI) :CWEr*	Simultaneous multiple regression
		PL and creativity (*Cs, Cfr, CWEr)*	MANCOVA ANCOVA
Q3: Is there a relationship between performance and creativity in architectural organizations? *(P : C)*	DIFF	Tier	Frequency distribution Independent samples t-test Spearman rho
		Creativity *(Cs, Cfr, CWEr)* : tier	Frequency distribution Spearman rho Simple regression/bivariate correlation Simultaneous multiple regression MANCOVA ANCOVA Mann-Whitney *U* test
Q4: Is there a relationship between value and performance in architectural organizations? *(V : P)*	DIFF	Value (*Js, Wv, Vd*)	Spearman rho
		Value (*PL, Js, Wv)* : Tier	Simultaneous multiple regression MANCOVA ANCOVA Mann-Whitney *U* test

Q5a: How well does a combination of values and creativity predict performance in architectural practice? (*V : C : P)?*	ASSOC	*Cs, Cfr, CWEr, Js, Wv, CI, PL, OE,* tier	Multiple regression
Q5: How well does a combination of values and performance predict creativity in architectural practice? (*V : P : C)?*		[1] Organizational creativity : *Js, Wv0, Wv10, Wv12, PL2, PL3, CWEr*	Multiple regression
		[2] Organizational creativity : *Cfr, Oe, Ls, Js, Cw, PL, Wv*	Multiple regression

*Discarded after correlation and reliabilities analyses

Internal Consistency Reliabilities

Cronbach's alphas were used to calculate reliabilities for summated scores of indices representing creativity *(Cf)*; for each of the constructs comprising the creative work environment, the index for *CWE;* for *workplace* values *(Wv),* job interdependence *(Ji)*; and indices for three value disciplines, *PL, OE,* and *CI*. For a five item scale, an alpha ≥ .70 were acceptable (Morgan et al., 2007); for the value discipline indices, slightly lower alphas were acceptable. For published scales where Cronbach's alphas were given, comparison with the adapted scale was made.

Simple Linear Regression/Bivariate Correlation

To examine how well one variable could predict another, simple linear regressions (bivariate correlations) were computed. From the adjusted R^2 value, the percentage of variance in the outcome variable was explained and effect size identified (Cohen, 1992).

Multiple Regression

The method used to compute multiple regression influences the information obtained; simultaneous multiple regression was used to examine predictors of creativity,

value, and performance. Where multiple regression was used in the analysis, a discussion of model loading accompanies the analysis with comparisons to prior models, as appropriate to examine change in R^2, or variables. Statistics employed to explore each research questions are indicated in Table 9 with findings detailed in Chapter IV.

As a between group study examining responses at the organizational level, analysis of responses by individual firms were not included in this study.

Evaluation of Quality and Efficacy

In climate studies similar to this research (see Appendix H), factors, instrumentation, and statistics were similar, with the exception of the e-survey distribution method. The efficacy of the approach is appropriate for examining relational and associational questions to build a foundation for expanded inquiry. Hayslett and Wildemuth (2004) compared three methods of survey distribution (paper by mail, web survey announced by mail, and web survey announced by e-mail; although their findings indicated lower responses for web surveys compared to paper surveys, e-mail notices were effective in promoting response rate. Many studies questioned how technologically savvy the participants might be as a factor in selecting web-based surveys. Chizawsky, Eastabrooks, and Sales (2011) found among busy nursing staffs, a significantly higher response rate (well above their anticipated 50% rate) was achieved using electronic surveys (84%) compared to paper surveys (16%); time in taking the survey was decreased from 33 minutes on the paper survey to 22 minutes on the electronic survey and more web respondents completed the survey on work time versus using break time.

Commonalities surfaced regarding survey instrumentation, regression analysis, and correlation statistics used in studies of creativity in the work environment. More

elaborate statistics including structural equation modeling have been used, but perhaps most telling is the consistency in choosing factor analysis and regression statistics. Multiple regression allowed development and testing of factor variance efficiently and was used to explore the potential for causal relationships. The theoretical foundation for this study in combination with the epistemological and philosophical positioning of the research design is an appropriate path with potential to yield quality results.

CHAPTER IV

DATA ANALYSIS AND FINDINGS

The purpose of this study was to investigate variables predicting or influencing organizational creativity in large architectural practices and examine their relationships to constructs of creativity, values, and performance. Eskildsen et al. (1999) found the relationship between organizational creativity and organizational excellence (performance) mediated by organizational learning suggesting research efforts encompassing more detailed examinations of organizational creativity. In this study, measures for the constructs of creativity, values, and performance investigated deeper connections and primary contributions to serve as the foundation for further study. Through this approach, architectural practitioners could be directed toward strategic activities and initiatives impacting organizational performance to more effectively utilize their organization's creative capital.

Findings address five research questions:

RQ1: What is organizational creativity in architectural practice?

RQ2: Is there a relationship between value and creativity in architectural organizations?

RQ3: Is there a relationship between creativity and performance in architectural practice?

RQ4: Is there a relationship between value and performance in architectural practice?

RQ5a: How well does a combination of values and creativity predict performance in architectural practice?

RQ5b: How well does a combination of values and performance predict creativity in architectural practice?

Chapter IV is divided into five sections--practice, creativity, values, performance, and implications for organizational creativity--with data analyses responding to each of the five research questions followed by discussion of findings of interest.

Data were collected from responses to an e-survey by 90 employees of five large architectural practices in the U. S. located in large metropolitan areas; California (Irvine and San Diego), New York (New York City), Illinois (Chicago) and Maryland (Baltimore). Participants accessed a link provided to them when the contact principal, as gatekeeper, sent an intranet e-mail with a survey invitation and survey site URL (see Appendix D). The survey took 15-20 minutes to complete and the data collection period varied dependent upon when respondents accessed the survey site.

A firm principal, or group of principals, was identified through the firm's website or the AIA's member directory and a phone call was placed to the firm to confirm the name of the principal(s) appropriate to contact for the research request, followed by direct and repeated phone calls to the identified individual(s). Once the principal was reached, correspondence moved to e-mail to send out the URL for initial review by the principal, to be followed by communication with employees to invite participation.

Of the thirty firms selected through stratified random sampling, ten in each of three tiers (Tier 1/TOP, Tier 2/MIDDLE, Tier 3/BOTTOM), three firms declined by e-mail after the initial letter contact to participate citing workload stresses; one of these firms indicated their practice was 'close to closing their doors' due to the economy. Twenty firms did not respond to the recruitment letter (see Appendix C), nor to 5-6 phone

calls and 2-3 emails to the principal contact(s). Seven firms agreed to participate in the study and employees from five of the seven firms accessed the site from December 2009 through November 2010. Two firms, one each from Massachusetts and California, agreed and planned to participate but no employees accessed the site. The total number of surveys accessed was 114; three individuals opted out, one survey was not completed and twenty individuals visited the site as part of reviewing content prior to opting to participate, but did not complete surveys. Ninety individuals ($N = 90$) completed the survey.

No firms from Tier I participated; three firms participated from Tier II with 36 surveys completed (40%) and two firms completed 54 surveys (60%) in Tier III (see Table 10). Participant choice to not respond to individual items was visually identifiable when data were examined case by case; these responses were coded as user-missing since responses were made in sequence by firm, traceable e in the sequential time block, or it was obviously related to choosing one response from many responses, such as certification/registration or work specialty.

Response rates could not be calculated; it was unknown if the invitation from the gatekeeper was inclusive to all employees or specified design staff or the actual time frame established by this contact principal. Although this method had its limitations from the outset, accessing internal organizational intranets to obtain individual employee e-mail addresses was discouraged by architecture and design professionals consulted prior to the survey release to eliminate issues related to protection of privacy.

The gatekeeper was instructed and agreed to send out the initial email invitation (see Appendix D) followed by two reminder prompts (Appendix E) one week apart. In

this area as well, it was difficult to determine how and if employees were reminded. The firms participating employed a fluctuating number of employees, ranging from 60 to 200 individuals, characterized as large scale practices by the AIA; on any given day staff numbers changed dramatically due to the economic impacts experienced in 2010. Representation of all positions in practice was valued over percentage of respondents in the study.

Table 10
Participant Firm Profile by Tier

Tier	Firms	# Firms	*n*	% of participants	Total %	Range of Total Design Revenue (millions)	Firm Total Design Revenue (millions)
I	1-36	-	-	0	0	$32.00-549.95	-
II	37-72	Firm A	18	20.0	-	$18.07-32.00	$39
		Firm B	17	18.9	40	-	$28
		Firm C	1	1.1	-	-	$31
III	73-109	Firm D	16	17.8	60	$4.65-17.90	$14
		Firm E	38	42.2			$12
	109	5	*N* = 90	100.0	100		

Architectural Practice

Ninety respondents from five firms represented a range of typical positions found across architectural practice. Position categories were aggregated to reflect levels of influence in decision-making - executive, mid-level management, project level, and support staff.

Position with the firm. Approximately eight-nine percent (89%) of respondents (*N* = 90) hold organizational positions (Demkin, 2008) with potential to influence policies and design decisions affecting the quality and direction of work in these firms as demonstrated in Table 11. With positions grouped by level of decision making influence, a moderate bi- modal distribution resulted with variables (Figure 5) approximately

normally distributed (skewness statistic[14] = .273). Over 33% identified themselves at executive; nearly 28% identified themselves in mid-level management positions; with 30% identifying project level positions. Nine percent of respondents were engaged in administrative roles.

Bimodal distributions may reflect human intervention or a rare event affecting development of a single modality (Pyrczak, 2009, p. 47). In 2007, architectural practices were concerned with a talent shortage in the pool of new hires (AIA Knowledge Resources, 2007) in positions from intern to architect. In 2010, architectural practices experienced a shortage of skilled mid-level management employees (Manpower, Inc., 2010) similar to that experienced by other U.S. organizations, which may explain an unanticipated higher frequency in the executive level; one might have expected fewer executive and mid- management level, a negatively skewed distribution.

Table 11
Participants by Position with Firm (N = 90)

Position	*n*	% of participants	Decision-making level/key
CEO, CFO, President, Principal, Owner, Partner	11	12.2	Executive/1
VP, Director, Board Member	5	5.6	
Regional Director, Division Director	1	1.1	
Associate	13	14.4	
Department Head, Manager, Senior Professional, Senior Associate, Studio Director	14	15.6	Mid-level management/2
Project Manager/Director	8	8.9	
Project Architect	9	10.0	Project staff/3
Project Interior Designer	1	1.1	
Interior Designer	2	2.2	
Architect	4	4.4	
Architect Intern	7	7.8	
Interior Design Intern	0	0	
Student Intern	1	1.1	
Project Designer	3	3.3	
LEED Coordinator	1	1.1	
Office Manager, Business Development, Marketing	10	11.1	Support staff/4
Total	90	100.0	

[14] Skewness statistic of +/- 1; data considered approximately normally distributed (Morgan et al., 2007).

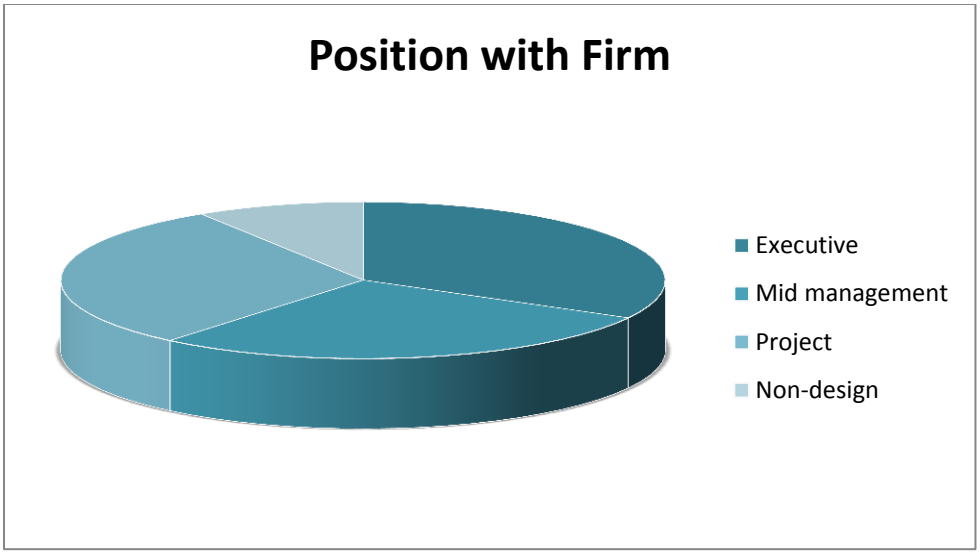

Figure 5. Distribution of respondents in executive (1), mid-level management (2), project management (3), and non-design (4) positions

Years with firm and in full-time practice. Sixty-five percent of respondents (*N*= 87) indicated they had been with their current firm less than 10 years (Table 12) as compared to 30% indicating full-time practice of less than 10 years. This difference may suggest:

- change of firm by experienced individuals attributed to mobility from one firm to another feasible in larger urban areas;
- downturn in the economy forcing experienced individuals to seek new placements due to termination;
- better offers for highly talented people; or
- greater choice in positions in an urban location.

Over 48% of respondents had been in practice more than 15 years; nearly 21% had been in practice over 25 years.

A scatterplot confirmed linear relationships with approximately normal distribution between years with firm and years in practice. To investigate statistically

significant association, Pearson product moment correlation was calculated (r (85) = .38, p = .001) indicating a statistically significant positive correlation between years with the firm and in practice. Not surprisingly, the greater years with a firm, the greater the years in full-time practice and the fewer years with firm, the fewer years in full-time practice. This r is considered to be a medium or typical effect size (Cohen, 1992) and r^2 indicating approximately 14% of the variance in years with firm can be predicted from years in practice.

Table 12
Years with Firm and in Full-time Practice (N=88)

Years with Firm (N = 90)	Frequency (#)	%	Valid %	Cumulative %
less than 1 year	12	13.3	13.5	13.5
1-5 years	27	30.0	30.3	43.8
6-10 years	19	21.1	21.3	65.2
11-15 years	11	12.2	12.4	77.5
16-20 years	8	8.9	9.0	86.5
21-25 years	8	8.9	9.0	95.5
26-30 years	4	4.4	4.5	100.0
Total	89	98.9	100.0	
Years in Full-time Practice (N = 88)				
less than 1 year	3	3.3	3.4	13.6
1-5 years	11	12.2	12.5	26.1
6-10 years	13	14.4	14.8	40.9
11-15 years	10	11.1	11.4	52.3
16-20 years	12	13.3	13.6	65.9
21-25 years	12	13.3	13.6	79.5
26-30 years	13	14.4	14.8	94.3
over 31 years	5	5.6	5.7	100.00
Total	88	97.8	100.0	

Gender. Two-thirds of participants were male and 33% female. Females reflect executive management levels similar to the AIA's reported percentages of women in executive positions (Klein, 2008), 37% compared to 40%, respectively. Klein found 6% of women occupied the most highly paid executive positions in architectural practice. In this study, of the respondents, three females (3%) occupied the most highly paid positions. Twenty-seven percent of females reported mid-level management positions and

20% project level management positions. This is somewhat atypical with female respondents reflecting increasingly higher representation at executive levels (see Table 13 for Gender and Position). Women in other staff non-design roles accounted for 17% of respondents.

Architecture is a male-dominated profession, despite strides in gender balance in recent years; to investigate whether males and females differ on position with firms, a chi-square statistic was used; assumptions were checked and met for independence of data, nominal measurement, and expected frequency[15]. The Pearson chi-square results indicated the distribution by gender was not significantly different in positions in the firms.

Table 13
Gender and Position (N = 90)

		Position (grouped)				Total
		executive management	mid-level management	project level management	non-design role	
Gender	female	11	8	6	5	30
	male	19	17	21	3	60
Total		30	23	27	10	90

Educational degree. Thirty-eight percent of participants hold masters degrees (MA, MS, MARCH) with 1% holding the Ph. D.; 53% of respondents held degrees in architecture with Masters of Architecture (32.2%) and Bachelor of Architecture (21.1 %) designations. The number of Masters of Architecture degrees may reflect bachelor level degrees in architecture transitioning to the M. Arch by some universities as bachelors level degrees are no longer considered the first professional degree in architecture, and

[15] Although one cell had an expected count of less than 5 responses, over 80% of expected cell frequencies was 5 or larger.

was replaced by the Masters level several years ago. In all, over 97% have post-secondary educational credentials, reflecting highly educated respondents.

Market segment experience. Participants reported their experience in multiple market segments: corporate/commercial (73%), education (68%), residential (56%), retail (55% each), hospitality (49%), government (40%), healthcare (40%), entertainment (21%), and financial services (17%). A small number of participants (14%) reported experience in transportation, industrial manufacturing and research and development (2% each) and recreation, brand strategy, urban planning, sustainability, cultural and preservation and detention, judicial and civic (1% each).

Professional affiliations, registrations and certifications. Participants were affiliated with professional organizations including the U.S. Green Building Council (USGBC; 56%) and the American Institute of Architects (AIA; 58%). Affiliations also included the American Society of Interior Designers (ASID; 2%), the International Interior Design Association (IIDA; 6%), Society of College and University Planners (SCUP; 3%), Society of Marketing Professional Services (SMPS; 5%), and 30% of respondents identified other affiliations including the Urban Land Institute (ULI; 3%), and the American Institute of Certified Public Accountants (AICPA; 1%). No affiliations with the International Association of Lighting Designers were reported. Over 8% of participants indicated an international professional affiliation related to architecture and other non-design professional associations; 2% reported no affiliation with a professional organization.

In terms of professional registrations or certifications requiring examination, over 78% identified themselves as Leadership in Energy and Environmental Design (LEED)

certified, 20% identified National Council of Architectural Registration Boards (NCARB) registration, and 6% with National Council of Interior Design Qualification (NCIDQ) certification.

Annual income. Over 42% of participants identified annual incomes over $85,000 with no participants reporting incomes of less than $25,000. The median annual salary for architects cited by the Bureau of Labor Statistics (BLS), Section 17-1011 Architects, Except Landscape and Naval (May 2009) is $78, 880; the mean annual salary of respondents was $77,400 (*M* = 4.12).

Summary of Demographic Profile

Respondents encompassed the full range of positions in large architectural practices located in urban locations in the west, mid-west and eastern United States. An overwhelming majority identified themselves as creative. They receive annual salaries commensurate with their positions; 22 respondents earned more than expected annual income over $105,000 (26%). The most frequently (mode) reported salary range was $45,001-$65,000. Females in these firms held positions approximating percentages reported by the American Institute of Architects for executive level positions and demonstrated increased percentages of participation as they held higher positions in the firm, similar to that of male counterparts in the same positions. Females did reflect a slightly higher representation as positions advanced to executive levels, atypical of the career path in architecture for women. Over half of participants hold 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.

Creativity in Architectural Practice

Creativity data encompassed a) employee self-reports of how creative they perceived themselves[16], b) measures of creativity intended to construct a composite index of job or firm creativity, and c) factors comprising the creative work environment thought to be significant. When architects and designers talk about "creativity", two assumptions were made: the organization employs the 'design process' in executing their work and the outcomes of their work are creative in some way. In this study, three referents for person, process, and environment (Rhodes, 1987) were targeted based on the assumption of creative product as an expected outcome of architectural practice.

Self-evaluation of Creativity (*Cs)*

Participants rated their level of creativity high; over 92% of design and non-design respondents rated 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), with a Likert scale (strongly agree = 1, strongly disagree = 5). To investigate how different the mean of the sample is compared to a hypothetical population mean, a one-sample *t*-test was calculated; assumptions of normally distributed variables and independence of data were met. When 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; participants were be assumed to be as creative as architects in the population, based on their scores, suggesting respondents evaluated themselves as more or less equally as creative as their design peers in practice. This finding suggests statistically, these participants were not influenced by knowledge of

[16] In the latest version of KEYS to Creativity and Innovation (T. Amabile and Center for Creative Leadership. 1987, 2009), a question has been added, *"I believe that I am currently very Creative in my work."*

the study's focus on creativity based on statistical similarity to a reasonable population mean. Self-evaluation of creativity (*Cs*) will be further examined with the two creativity measures for process and work environment later in this analysis.

Creativity as a Component of Job or Firm Function *(Cf)*

To examine the extent to which creativity is perceived an integral part of the function of the job or firm as a whole, the second measure of creativity combined five items with responses on a Likert scale (strongly agree = 1, strongly disagree = 5). Pearson product moment correlations were computed to examine the intercorrelations of the items. Each of the five items met assumptions of approximately normally distributed; linearity was not markedly violated. Table 14 shows all ten pairs of items significantly correlated, meaning items developed for the scale have a statistically significant relationship to one another.

Table 14
Intercorrelations, Means, and Standard Deviations for Creativity (Cf) Variable (N = 78)

Item	*Item102*	*Item103*	*Item104*	*Item105*	*Item106*	*M*	*SD*
*Item102:*This firm produces innovative projects	--	.70**	.63**	.47**	.60**	2.16	.84
*Item103:*Project tasks call for people to be creative	--	--	.69**	.48**	.58**	2.13	.71
*Item104:*People are encouraged to be creative in the firm	--	--	--	.57**	.67**	2.02	.70
Item105:People are encouraged to take risks in this firm	--	--	--	--	.63**	2.73	.83
Item106:Overall, the current work of the firm is conducive to personal creativity	--	--	--	--	--	2.34	.80

** p = .001

The mean score for combined items for *Cf* was 2.28 (*SD* = .64) for all respondents (*N* = 78) and 1.63 ((*SD* = .67) when non-design staff (*N* = 75) were excluded. In general, creativity was perceived as an integral component of the job or firm. To examine internal consistency reliability for the five item index, Cronbach's alpha was computed for all staff, since no differences were detected between design and non-design respondents,

resulting in an unstandardized alpha of .88, above the threshold established for reliability ($\alpha \geq .70$) and acceptable for a five item scale.

To ascertain whether *Cf* differed across firms, means of each firm's *Cf* index were compared by computing a one-way ANOVA. No statistical difference was found across firms for the *Cf* index; there was no difference in the extent to which creativity was perceived as a part of job function across firms.

***Cs* and *Cf* relationships.** 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, the correlation between self-evaluation of creativity *(Cs)* and the creativity *(Cf)* index was computed using the Spearman rho statistic with *Cs* a nominal variable; the correlation was not statistically significant, $r_s\,(76) = .04$, $p = .697$. The lack of a demonstrated relationship between how creative an individual rated oneself and perceptions of creativity as a part of job or firm invited continued inquiry into the creativity constructs in architectural practice.

Creative Work Environment *(CWE)*

A third measure of creativity was developed to assess the creative work environment using factors similar to and found significant in prior climate studies of work environments (Amabile, 1996; Amabile & CCL, 1987, 2009; Amabile & Gryskiewicz, 1989; Damanpour, 1991; Haynes et al., 1999; Hunter et al., 2007; Majaro, 1991). In addition to creativity of the job/work (*Cf*) discussed above, ten factors were examined: *organizational encouragement (Oe), intellectual stimulation* (*Is), leader support and feedback (Ls), positive interpersonal exchange (Pi), sufficient resources (Sr), freedom (F), challenging work (Cw), workload demands (Wd), organizational*

roadblocks (Or), and *productivity (P)*. The five items comprising each factor were found to be approximately normally distributed and assumptions for linearity and independence were met.

Index correlations and reliabilities. Pearson correlations were computed to examine intercorrelations for the five items comprising each index. Correlations were computed for respondents. Appendix J.1 through J.10 presents factor intercorrelations, means, and standard deviations for each of ten creative work environment indices and their reliabilities; the index for creativity of the job or firm (*Cf*) was discussed in a prior section. Six indices had internal consistency reliabilities less than .70, *positive interpersonal exchange* (.09), *freedom* (.16), *sufficient resources* (.65) and *workload demands* (.48) adapted from instruments developed by Haynes et al. (1999), and *organizational roadblocks* (.48) and *productivity* (.23). Four measures had acceptable reliabilities (α): *organizational encouragement* (.79), *intellectual stimulation* (.83), *leader support and feedback* (.81), and *challenging work* (.80). When the internal consistency reliability for the *CWE* index using each of the eleven indices was computed, a Cronbach's alpha for the summated scores (α = .68) was marginal in terms of acceptability.

Contradiction of certain indices to provide acceptable reliability thresholds within *CWE* warranted further exploration of the factor structure for this measure. Pearson correlations were computed to examine the intercorrelations of the eleven variables and are shown in Table 15; 32 of 55 correlations were significant.

The strongest positive correlations, $p < .001$, were found between:

- *Organizational encouragement* and*:*
  - Intellectual stimulation, r (68) = .64

- Leadership support and feedback, *r* (68) = .58
- Creativity, *r* (68) = .58;
- Challenging work, *r* (68) = .48
- Positive interpersonal exchange, *r* (68) = .45
- Sufficient resources, *r* (68) = .32

- *Intellectual stimulation* and*:*
  - Creativity, *r* (68) = .70
  - Leadership support and feedback, *r* (68) = .56
  - Challenging work, *r* (68) = .54
  - Positive interpersonal exchange, *r* (68) = .43
  - Sufficient resources, *r* (68) = .38
  - Productivity, *r* (68) = .31

- *Leadership support and feedback* and:
  - Creativity, *r* (68) = .57
  - Challenging work, *r* (68) = .43
  - Positive interpersonal exchange, *r* (68) = .41

- *Positive interpersonal exchange* and:
  - Challenging work, *r* (68) = .48
  - Creativity, *r* (68) = .42
  - Sufficient resources, *r* (68) = .32

- *Sufficient resources* and:
  - Challenging work, *r* (68) = .45
  - Creativity, *r* (68) = .40

- *Freedom* and:
  - Creativity, *r* (68) = .36

- *Challenging work* and:
  - Creativity, *r* (68) = .67

- *Workload demands* and:
  - Organizational roadblocks, *r* (68) = .67

- *Creativity* and:
  - Productivity, *r* (68) = .34

The strongest negative correlations were found between:

- *Organizational encouragement* and*:*
  - Organizational roadblocks, *r* (68) = -.61

- *Intellectual stimulation* and*:*
  - Organizational roadblocks, *r* (68) = -.58

- *Organizational roadblocks* and*:*
  - Creativity, r (68) = -.52

- *Positive interpersonal exchange* and*:*
  - Organizational roadblocks, r (68) = -.49

- *Sufficient resources* and*:*
  - Organizational roadblocks, r (68) = -.38

- *Leader support and feedback* and:
  - Workload demands, r (68) = -.36

- *Challenging work* and*:*
  - Organizational roadblocks, r (68) = -.35

Table 15.
Intercorrelations, Means, and Standard Deviations for Creative Work Environment (CWE) Composite Variable (N = 70)

	Oe	Is	Ls	Pi	Sr	F	Cw	Wd	Or	Cf	P	*M*	*SD*
1. Organizational encouragement *(Oe)*	--	.64**	.58**	.45**	.32**	.20	.48**	-.23	-.61**	.58**	.21	2.56	.69
2. Intellectual stimulation (*Is*)	--	--	.56**	.43**	.38**	.22	.54**	-.20	-.58**	.70**	.31**	2.41	.71
3. Leader support and feedback *(Ls)*	--	--	--	.41**	.29*	-.08	.43**	-.36**	-.40**	.57**	.21	2.28	.64
4. Positive interpersonal exchange *(Pi)*	--	--	--	--	.32**	.19	.48**	-.14	-.49**	.42**	.28*	2.32	.36
5. Sufficient resources *(Sr)*	--	--	--	--	--	.28*	.45**	-.25*	-.38**	.40**	.26*	2.34	.53
6. Freedom *(F)*	--	--	--	--	--	--	.25*	.11	-.22	.36**	.09	2.42	.38
7. Challenging work *(Cw)*	--	--	--	--	--	--	--	.02	-.35**	.67**	.35**	1.97	.53
8. Workload demands *(Wd)*	--	--	--	--	--	--	--	--	.32**	-.06	-.09	2.47	.47
9. Organizational roadblocks *(Or)*	--	--	--	--	--	--	--	--	--	-.52**	-.06	3.22	.55
10. Creativity *(Cf)*	--	--	--	--	--	--	--	--	--	--	.34**	2.23	.65
11. Productivity *(P)*	--	--	--	--	--	--	--	--	--	--	--	2.68	.41

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

Examining the factor structure of *CWE*. Principal axis factor analysis (PA) with varimax rotation was conducted to examine the factor structure for the eleven measures of the creative work environment index (*CWE*) including *Cf*, to investigate whether different groupings of items representing any measure would be more effective and reliable. Assumptions of normality, linear relationships between pairs of items, and pairs moderately correlated were met. Eleven factors were requested, based on the items designed to index the eleven original indices: *organizational encouragement (Oe), intellectual stimulation* (*Is*), *leader support and feedback (Ls), positive interpersonal exchange (Pi), sufficient resources (Sr), freedom (F), challenging work (Cw), workload demands (Wd), organizational roadblocks (Or), creativity (Cf),* and *productivity (P).*

After rotation, the first factor seemed to index *creativity* and accounted for 14.2% of the variance, with strong loadings for twelve items. The five items from the original creativity index (*Cf)* were included in the factor loading as the first three (1-3), seventh and eighth items. The remaining seven items indexed strong loadings on creativity, but were items intended to index other factors; *intellectual stimulation* ("There is an awareness of expectations regarding creative performance" and "There is a great deal of idea exchange that goes on every day"), *challenging work* ("This firm offers opportunities to work on challenging projects," "Work in this firm is important and meaningful" and "Employees feel challenged by the projects currently in the firm"), and *organizational encouragement* ("This firm encourages an active flow of ideas"). Four additional items indexed low creativity and were intended to index *challenging work* ("Day to day assignments in this firm are challenging"), *intellectual stimulation* ("The firm encourages continuous professional development through learning"), and

productivity ("Overall, the firm is efficient in the way work is accomplished" which also cross-loaded on the factor which seemed to index group support (.41), and "The procedures used by the firm are effective").

The second factor, which seemed to index *encouragement of creativity,* accounted for 9% of the variance, with a loading of nine items. Three items indexing organizational encouragement were the first, second, and fifth items loading on this factor. Three remaining items indexed *organizational encouragement* but were intended to index *organizational roadblocks;* one with a high negative factor loading ("People are too critical of ideas in this firm;" high factor loading) and two items with low negative factor loadings ("Top management does not take risks" and "This firm emphasizes doing things the way they have always been done"). Two remaining items indexed high factor loadings but were intended to index *positive interpersonal exchange* ("Members of this firm challenge each other's ideas in a constructive way" and "Team members back each other up at work"); this last item also had low cross-loading on the factor but was intended to index *group support* (.49).

The third factor which seemed to index *work demands (time)* accounted for 6.4% of the variance with loading on the next six items; the first five were intended to index *work demands*. Four of the five items had negative loadings; three with strong factor loadings ("Team members leave work feeling they have not completed everything to be done," "Accomplishing basic tasks prevents people from completing more important ones," and "There are conflicting demands on people's time") and one item low (.48) on the work demands factor ("People in the firm do not have enough time to carry out their work"). The sixth item loading on the factor (.40) on *work demands* but was intended to

index *leader support and feedback* ("Work assignments stimulate exchanges among staff").

The fourth factor had only one item load on it and seemed to index *leadership support and feedback*; the item was intended to measure this factor ("Project managers/supervisors offer constructive feedback to enhance the firm's innovation").

The fifth factor, which seemed to index *autonomy in decision-making,* accounted for 4.8% of the variance and intended to measure *freedom*. Two items had strong negative loadings ("Management decides how the staff will accomplish work assignments" and "Management decides how best to carry out tasks to accomplish work"); the last item indexed low (.43) on *freedom* ("Employees determine the methods and procedures used to do their work").

The sixth factor which seemed to index *group support* accounted for 4.7% of the variance with three items loaded; these were intended to measure *positive interpersonal exchange*. Two items had strong factor loadings ("My team members would pitch in to help me with a difficult task" and "The people in my work group are committed to our work"); one item had a low (-.41) negative factor loading ("In a crisis situation, it's everyone for themselves").

The seventh factor, which seemed to index *work support,* accounted for 4.6% of the variance with three items. Two items had strong factor loadings ("Facilities needed for projects are appropriate" and "Access to resources is not a problem in this firm"). The third item had a low negative factor loading (-.46) intended to measure *productivity* ("The firm operates with procedures and operational structures that are too formal").

The eighth factor, which seemed to index *work deterrents*, accounted for 3.9% of the variance with three items. The first item, intended to index organizational roadblocks, had strong negative loadings ("There is destructive competition within this form"); the second item, intended to index sufficient resources, had strong loadings ("Information gathered in project research makes projects more creative"); and the third item, intended to index productivity, also had strong negative loadings ("Distractions from project work to meet client demands are daily occurrences").

The ninth factor, with two items loading, seemed to index *employee decision-making*, accounted for 3.3% of the variance, with items intended to index *organizational encouragement* ("Failure is an acceptable outcome, if the effort was appropriate") and *freedom* (Employees decide when to take breaks from their work tasks").

The remaining two measures with one item loading could not be identified as or tied to an *a priori* conceptualization. Three items did not have significant loadings (< .40) on any factor ("Work quality is important to members of the firm," "Constructive feedback to everyone is given in this firm" and "Budgets for project(s) are generally adequate"). Over 61% of the variance was explained by this model of nine factors.

Table 16 displays items and factor loadings for rotated factors, with loadings less than .40 omitted to improve clarity. Factor analysis suggested new combinations of items. When reliability differences deviating from findings of previous studies were revealed (Amabile, 1996; Amabile & CCL, 1989, 2009; Amabile & Gryskiewicz, 1989; Hunter et al., 2007; Damanpour, 1991), decisions to include and exclude items were made affecting the *CWE* and *Cf* indices. Cronbach's alphas also differed from reported findings contributing to the decision to a) revise the indices for creativity of the job or firm (*Cfr*);

b) use the original index items for challenging work (*Cw*), leadership support, and feedback (*Ls*), organizational encouragement (*Oe*), and intellectual stimulation (*Is*); and c) exclude each of the six indices with Cronbach's alpha < .70 (positive interpersonal exchange, sufficient resources, freedom, workload demands, organizational roadblocks, and productivity). A discussion of these changes is presented in the following sections.

Revised Creativity of the Job or Firm Index (*Cfr*)

Cronbach's alpha increased from $\alpha = .88$ to .92 when all sixteen items from the PA were included based upon factor loading. The creativity index 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. The increase in Cronbach's alpha was minimal $(.04)$, supporting the decision 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 creativity); b) use each of the five original items for *Cf*; 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: *C1-5, Oe 1* and *P 1, P5* with a resulting Cronbach's alpha of .89.

Table 16.

Factor Loadings (Rotated) for Creative Work Environment (CWEr)

Items	Statements	1	2	3	4	5	6	7	8	9	Com
Cf3	People are encouraged to be creative in the firm	.79									.95
Cf2	Project tasks call for people to be creative	.75									.90
Cf1	This firm produces innovative projects	.73									.93
Is2	There is an awareness of expectations regarding creative performance	.70									.94
Is1	There is a great deal of idea exchange that goes on every day	.69									.91
Cw1	This firm offers opportunities to work on challenging projects	.59									.88
Cf5	Overall, the current work of the firm is conducive to personal creativity	.59									.96
Cf4	People are encouraged to take risks in this firm	.54									.86
Is5	People engage in debate and discussion about "good" design	.54									.93
Cw5	Work in this firm is important and meaningful	.53									.86
Oe1	This firm encourages an active flow of ideas	.52									.93
Cw3	Employees feel challenged by the projects currently in the firm	.51									.87
Cw2	Day to day assignments in this firm are challenging	.47									.87
Is3	The firm encourages continuous professional development through learning	.45									.88
P5	Overall, this firm is efficient in the way work is accomplished	.44									.93
P1	The procedures used by the firm are effective	.43									.93
Oe5	Top management appreciates creative ideas		.74								.92
Oe4	People are rewarded for creative work in this firm		.69								.89
Or5	People are too critical of new ideas in this firm		-.64								.91
Pi2	Members of the firm challenge each other's ideas in a constructive way		.61								.89
Oe2	People are recognized for their creative contributions to clients		.53								.91
Pi1	Team members back each other up at work		.52								.89
Or4	Top management does not take risks in this firm		-.49								.91

Or1	This firm emphasizes doing things the way they have always been done		-.44								.85
Ls5	Project managers/supervisors encourage people in the firm to develop new skills		.42								.91
Cw5	Work quality is important to members of the firm										.89
Wd3	Team members leave work feeling they have not completed everything to be done			-.82							.89
Wd4	Accomplishing basic tasks prevents people from completing more important ones			-.69							.88
Wd5	People in this firm have time to execute best practices when producing their work			.69							.92
Wd2	There are conflicting demands on people's time			-.60							.88
Wd1	People in the firm do not have enough time to carry out their work			-.48							.84
Is4	Work assignments stimulate exchanges among staff			.40							.81
Ls2	Project managers/supervisors encourage staff to give their best effort				.76						.91
Ls1	People usually know whether or not their work is satisfactory				.62						.93
Ls3	Project managers/supervisors set an example by working hard themselves				.51						.84
Ls4	Project managers/supervisors offer constructive feedback to enhance the firm's innovation				.44						.94
Or3	Constructive feedback to everyone is given in this firm										.81
F4	Staff have freedom to plan their own work					.75					.94
F3	Management decides how the staff will accomplish work assignments					-.67 -.65					.87
F5	Management decides how best to carry out tasks to accomplish work					.43					.82
F1	F1:Employees determine the methods and procedures used to do their work					.75					.83
Pi4	My team members would pitch in to help me with a difficult task						.73				.89
Pi5	The people in my work group are committed to our work						.69				.90
Pi3	In a crisis situation, it's everyone for themselves						-.41				.87
Sr1	Facilities needed for projects are appropriate							.82			.87
Sr2	Access to resources is not a							.65			.89

	problem in this firm										
P2	Distractions from project work to meet client demands are daily occurrences							-.46			.93
Oe3	Failure is an acceptable outcome, if the effort was appropriate										.79
F2	Employees decide when to take breaks from their work tasks								-.64		.92
P4	This firm is productive in getting projects completed on time								.59		.82
Sr5	Access to project information is available to team members								-.51		.81
P3	The firm operates with procedures and operational structures that are too formal									.56	.74
Sr3	Budgets for project(s) are generally adequate									.54	.89
Or2	There is destructive competition within this firm										.82
Sr4	Information gathered in project research makes projects more creative										.92
	Eigenvalues	7.81	4.97	3.55	2.67	2.65	2.58	2.54	2.16	1.82	
	% of variance	14.2	9.0	6.4	4.8	4.8	4.7	4.6	3.9	3.3	

Note: Loadings < .40 omitted

Revised Creative Work Environment Index (*CWEr*)

Five indices comprise the revised creative work environment index (*CWEr)* with 28 items:

- *Creativity of the job or firm: C1-5, Oe 1, P1,* and *P5* (refer to discussion above)
- *Organizational encouragement: Oe 1-5*
- *Leadership support and feedback: Ls 1-5*
- *Intellectual stimulation: Is 1-5*
- *Challenging work: Cw 1-5*

Cronbach's alpha for *CWEr* = .87 compared to the original set of indices, α = .70 demonstrating increased reliability (note: WEI reported $\alpha = .70$).

In Hunter et al.'s (2007) meta-analysis, positive interpersonal exchange, intellectual stimulation, challenge and organizational encouragement were found to have

significant effect sizes and autonomy, resources and reward with small or negligible effect sizes, according to Cohen (1992). The changing context of the workplace during an economic crunch may mean in a creative work environment such as architectural practice, freedom, positive interpersonal exchange, workload demand and organizational roadblocks may be conceptualized differently. Table 17 compares factors used in three different studies against the latest KEYS version and this study.

Indices eliminated from *CWEr*. Although six indices were reported to be reliable in other studies, they did not exhibit acceptable internal consistency here and were subsequently excluded in the revised *CWEr* index.

Positive interpersonal exchange. This measure, used in Haynes et al.'s (1999) study of healthcare workers collected data on peer support. With teamwork as the method of project and service delivery in large scale architectural practices, the extent to which participants perceived a sense of togetherness and cohesion in their firm with little emotional conflict may have masked the importance of this index. The majority of respondents "agreed" or "strongly agreed" to expectations of 'backing each other up, constructively challenging each other's ideas, pitching in on a difficult task and work commitment' (α = .09) although the reliability of this index was unacceptable.

***Productivity*.** The extent to which the unit is efficient, effective, and productive, may be a redundant measure in architectural practice with success in these areas directly linked to business profitability and maintenance; participants would have to agree that accomplishing these work requirements was vital and necessary in terms of 'effective procedures, minimal distractions from client demands, appropriate levels of formality related to procedures, getting the work completed and working efficiently (α = .23).

Table 17

Comparison of Factors across Three CWE Studies: KEYS (2009), CWE, and CWEr

WEI, 1989	Haynes et al., 1999	Hunter et al., 2007	KEYS, 1987, 2009	Leigh *CWE*, 2011	Leigh *CWEr*, 2011
Creativity	-	Flexibility and risk-taking Product emphasis	Creativity	Creativity	Creativity
Challenge	Professional compromise	-	Challenging work	Challenging work	Challenging work
Coworkers	Peer support	Positive interpersonal exchange	Work group supports	Positive interpersonal exchange	-
Supervisor	Leader support Feedback	Positive supervisor relations Top management support	Managerial encouragement	Leadership support and feedback	Leadership support and feedback
Unity and cooperation	-	Mission clarity Reward orientation Participation Organizational integration	Organizational encouragement	Organizational encouragement	Organizational encouragement
Productivity	Role clarity	-	Productivity	Productivity	-
Resources	-	Resources	Sufficient resources	Sufficient resources	-
Creativity supports	-	Intellectual stimulation	-	Intellectual stimulation	Intellectual stimulation
Freedom	Autonomy and control Influence over decisions	Autonomy	Freedom	Freedom	-
Recognition	-	-	-	-	-
Time pressure	Work demands	-	Realistic workload pressure	Workload demand	-
Evaluation	-	-	-	-	-
Status quo	-	-	-	-	-
Political problems	Role conflict	-	Organizational impediments	Organizational roadblocks	-

Sufficient resources. The items expected to measure the extent to which facilities and resources were available within the context of procedures and operational structures enabling the work to be accomplished produced a Cronbach's alpha = .65. Although approaching an acceptable reliability, again, architectural practice is resource abundant

and highly dependent on availability and accessibility to resources to accomplish work tasks.

Freedom. The extent to which one perceives 'autonomy in choice of tasks and can choose how to conduct methods and procedures, work assignments, how the work is planned and carried out' also reflected low internal consistency reliability (α = -.16) or average correlation. The level of autonomy in architectural practice may, as in the items for positive interpersonal exchange and productivity, be a given in practice environments. However, the reliabilities of this index dramatically differed from Haynes et al.'s (1999), assuming their study confirmed a reliability of at least .70 for autonomy and control. In contrast to these findings, Vithayathawornwong et al.'s (2003) study of non-design organizations found freedom to be one of two factors important to the creative work environment; however, items in this study were not successful in confirming reliability for this index. In Hunter et al.'s (2007) study, autonomy demonstrated the smallest effect size of variables included in the meta-analysis suggesting continued exploration of the role freedom and autonomy in creative work environments.

Workload demands. The extent to which time pressure is perceived to be constricting and unreasonable expectations for performance are evident with work assignments stimulating exchange among staff. The original five item scale did not exhibit an acceptable reliability, α = .48; adding a sixth measure decreased the reliability of the measure, α = .23.

Organizational roadblocks. This last index also did not perform well in terms of reliability, with a Cronbach's alpha = .48, measuring the extent of negative feedback, destructive competition and risk-taking.

Creativity Index

Cs, Cfr, and *CWEr* were conceptualized to represent organizational creativity in architectural practice, to consider person, process and environment. However, Cronbach's alpha for this index was .54; a summated index was not reliable with these three indices combined.

***Cs, Cfr,* and *CWEr* Relationships**

Because each of the three creativity variables was found to be normally distributed and the assumption of linearity was not markedly violated, Spearman rho correlations were computed to examine the intercorrelations of variables. Table 18 shows one of three pairs of variables were significantly correlated; the strongest positive correlation, considered a much larger than typical effect size (R^2 = .78) according to Cohen (1992), was between the extent creativity was an integral part of job functions in firms (*Cfr)* and the creative work environment (*CWEr*), r_s (71) = .85, $p < .001$. Participants who perceived creativity as an integral part of the job function were very likely to positively perceive the factors comprising the creative work environment (*creativity, challenging work, leader support and feedback, organizational encouragement* and *intellectual stimulation*). Since *Cfr* was included in the index for the *CWEr*, correlations were calculated using Spearman rho for *CWEr* excluding the *Cfr* index; the relationship of *Cfr* and *CWEr,* r_s (71) = .85, $p < .001$ had a reduced effect size, R^2 = .60, still larger than typical according to Cohen (1992).

Table 18
Intercorrelations, Means, and Standard Deviations for Creativity Variables (N = 71)

Variables	*Cs*	*CWEr*	*Cfr*	*M*	*SD*
Self-evaluation *Cs*	--	.04	-.02	1.62	.59
Creative work environment *CWEr*		--	.88**	2.30	.51
Creativity of the job *Cfr*			--	2.33	.60

** $p = .01$

Simultaneous multiple regression was conducted to investigate the best linear combination of variables predicting *CWEr*; assumptions were met. The means, standard deviations, and intercorrelations are shown in Table 19.1. This combination of variables predicting creativity was statistically significant, F (2, 70) = 132.64, $p < .001$. The beta coefficients are presented in Table 19.2; *Cfr* significantly predicts the creative work environment when *Cs* was included; the adjusted R^2 value was .785, indicating 78% of the variance in the creative work environment was explained by the variables included in the model and according to Cohen (1992), this is a much larger than typical effect size. To examine the influence of *Cfr*, when *Cfr* was eliminated from the *CWEr index*, F (2, 70) = 72.43, $p < .001$, $R^2 = .66$; according to Cohen still a larger than typical effect size.

The assumption that architectural practices are similarly creative was tested by computing a one-way ANOVA to examine the variance of means for four of five firms in the study.[17] A statistically significant difference was found among the four firms on creative work environment (*CWEr*), F (3, 69) = 2.89, $p = .042$. Table 20.1 shows 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. In Table 20.2, the results of the post hoc Tukey HSD Test indicated firm D differed from firms A, B, and C on *CWEr* ($p < .05$, $d = .87$; a smaller than typical effect size

[17] One firm was eliminated for this analysis with only 1 participant

according to Cohen ,1992 ; R^2 = .16). In rejecting the null, it appears that some firms may be more creative than others in practice.

Table 19.1
Means, Standard Deviations, and Intercorrelations for Creative Work Environment and Predictor Variables (N = 73)

Variable	*M*	*SD*	r_s	
			Cs	*Cfr*
Creative work environment (*CWEr*)	2.30	.51	.04	.89**
Predictor variable				
1. Self-evaluation (*Cs)*	1.62	.59	--	-.02
2. Creativity of the job (*Cfr*)	2.33	.60	--	--

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

Table 19.2
Simultaneous Multiple Regression Analysis Summary for Self-Evaluation of Creativity and Creativity of the Job Predicting Creative Work Environment (N = 73)

Variable	*B*	*SEB*	*β*
Self-evaluation (*Cs)*	.05	.05	.06
Creativity of the job (*Cfr*)	.76	.05	.89**
Constant	.44	.14	

Note: R^2 = .78; F (2, 70) = 132.64, $p < .001$.
** $p < .01$ * $p < .05$.

Table 20.1
Means and Standard Deviations Comparing Creativity Measures for Four Firms

	Cs		*Cfr*		*CWEr*	
Firms	*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 20.2
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			

Research Question [1] Analysis

1. What is organizational creativity in architectural practice?

Creativity in architectural practice was examined using three indices representative of person, process, and environment. One's self-evaluation (person) was not found to be significantly related to creativity of the job or firm (process) or the creative work environment (press); *Cs, Cfr,* and *CWEr,* respectively. The index, representing summated measures describing the extent to which creativity is perceived as part of the job function of the firm (process), was shown to have high reliability (α = .92). Factors comprising the revised *CWE*, *creativity, challenging work, leadership support and feedback, organizational encouragement,* and *intellectual stimulation* were significantly related to the extent creativity is perceived as a part of the job or firm. Creativity appears to differ in the context of architectural practice with diminished relationships with certain factors identified in other studies.

Creativity in practice is diverse, from communication venues to intellectual stimulation, from products produced to continued learning. The National Architectural Accrediting Board, on their web site (naab.org) offered this description of practice:

> Architects are licensed professionals trained in the art and science of the design and construction of buildings and structures…primarily provid[ing] shelter. Additionally, architects may be involved with designing the total built environment—from how a building integrates with its surrounding landscape to architectural or construction details that involve the interior of the building to designing and creating furniture to be used in a specific space.
>
> An architect will create the overall aesthetic and look of buildings and structures, but the design of a building involves far more than its appearance. Buildings also must be functional, safe, and economical and must suit the specific needs of the people who use them. Most importantly, they must be built with the public's health, safety and welfare in mind.

This definition might embrace creativity directly by recognizing these qualities in AIA's branding and communication messages. In a taped telecast, a speaker at an AIA sponsored lecture defined architects by three criteria directly targeting creativity; developing multiple solutions, conceptualizing ideas, and trained to think creatively (AIA, 2007). Creativity appears minimally related, within this study, to architects' self-perceptions. Creativity remains intangible – a way of thought, a way of forming language, expressions, and debate, in addition to a function of continual learning as embodied in highly educated individuals making a successful and diversified living requiring creativity. The significance of creativity as a function of the job or firm reinforces research findings (Amabile, 1996; Hunter et al., 2007); the specific factor structure in this study found creativity as a component of the job or firm, challenging work, leader support and feedback, organizational encouragement, and intellectual stimulation to underlie the structure of the creative work environment similar to earlier studies. The findings support and define the importance and the existence of creativity in practice, adequate to enable the continued connection of creativity conceptualized as person, process, and environment in practice to organizational learning through the examination of values perceived by employees of architectural practice.

Values in Architectural Practice

The construct of value, a component of organizational learning, has been emphasized through examination of individual productivity and participation in corporate cultures (Tseng & McLean, 2008). However, the "…lack of studies … [exploring] strategic HRD practices broadly and their relation to organizational learning" (p. 419) to reinforce the role of HRD was pointed out by Tseng and McLean.

Four approaches to examine values held by respondents were used: a) the ten item *workplace values* scale developed by Van Dyne et al. (1999) (as cited in Fields, 2002, p. 284) measured the extent to which firm employees place value on quality, innovation, cooperation, and wide participation in decision-making; b) a five item scale adapted from measures for *job interdependence* developed by Dean and Snell (1991) measuring the extent to which people performing a job must rely on or collaborate with others to complete their work; c) an indicator for *job satisfaction*; and d) a nine item scale with three statements each attributable to one of three *value disciplines* to achieve market leadership (Treacy & Wiersema, 1995).

Workplace Values (*Wv)*

Respondents were asked about the extent to which the firm places importance on quality, innovation, cooperation, and wide participation in decision making adapted from the published measure (Van Dyne et al., 1994) with responses of agreement on a Likert scale ranging from "strongly agree" (1) to "strongly disagree" (5). Two items were deleted from the original set of twelve items (i.e., high quality products and services of central importance, and individual employees recognized and rewarded for helping others); the published Cronbach's alpha = .89 (as cited in Fields, 2002, p. 284). Because

items were normally distributed and the assumption of linearity was not markedly violated, Pearson correlations were computed to examine the intercorrelation of items. Table 21 shows 29 of 39 pairs were significantly correlated. Cronbach's alpha = .86, which is considered a strong reliability (Cohen, 1992).

Job Interdependence (*Ji*)

Five statements were adapted (Deana & Snell, 1991) asking respondents about the extent to which group members rely on or collaborate with others to complete their work. Responses used a 5-point Likert scale ranging from "strongly agree" (1) to "strongly disagree" (5). Dean and Snell had used a 7-point Likert scale and cited "coefficient alpha values for …each dimension rang[ing] from .69 to .80 …across different types of jobs" (as cited in Fields, 2002, p 100). Because the items were normally distributed and the assumption of linearity was not markedly violated, Pearson correlations were computed to examine intercorrelation from respondents. Table 22 shows five of 10 pairs were significantly correlated. Cronbach's alpha was .58, a somewhat weak measure of reliability in comparison to the published alpha range.

Expectations of *team collaboration and group or team support*, although not directly evident in the measures used by Ekvall and Ryhammer (1999) and Ryhammer and Smith (1999), were deemed important in the studies by Haynes et al., 1999 and Hunter et al., 2007; this measure was not used in subsequent analyses given its weak reliability ($\alpha = .58$).

Table 21

Intercorrelations, Means, and Standard Deviations for Ten Workplace Value (Wv) Items (N = 76)

	1	2	3	4	5	6	7	8	9	10	*M*	*SD*
1. Individual employees are recognized and rewarded for superior performance	--	.40**	.28*	.85**	.31**	.39**	.52**	.42**	.46**	.32**	2.66	1.04
2. Reputation for quality surpasses major competitors	--	--	.60**	.39**	.65**	.33**	.38**	.37**	.22	.50**	2.50	.87
3. Innovative is of central importance	--	--	--	.21	.59**	.23*	.26*	.23*	.23*	.33**	2.70	.92
4. Individual employees are recognized and rewarded for innovative work	--	--	--	--	.30**	.40**	.40**	.38**	.46**	.34**	2.80	.99
5. Reputation for innovation surpasses major competitors	--	--	--	--	--	.27*	.21	.34**	.27*	.34**	2.84	.91
6. Widespread participation in decision-making in the firm is highly valued	--	--	--	--	--	--	.64**	.69**	.29*	.42**	3.03	.98
7. Employees are encouraged to express minority points of view	--	--	--	--	--	--	--	.68**	.30**	.42**	2.67	.90
8. Procedures facilitate widespread participation in decision-making	--	--	--	--	--	--	--	--	.31**	.30**	3.16	.86
9. Cooperation among employees is highly valued	--	--	--	--	--	--	--	--	--	.44**	2.00	.75
10. Reputation is as a very friendly place to work compared with other firms	--	--	--	--	--	--	--	--	.--	--	2.16	.77

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

Table 22

Intercorrelations, Means, and Standard Deviations for Five Job Interdependence (Ji) Variables (N = 66)

Variable	1	2	3	4	5	*M*	*SD*
1. People on my team have to coordinate with other people in the firm	--	.45**	.31*	.40**	-.27*	1.91	.65
2. Team members complete work that is started by others in the firm	--	--	.40**	.77**	-.11	2.38	.80
3. Dealing with people outside the team is required to get the job done	--	.--	--	.36**	-.07	2.09	.80
4. Team members start work that is finished by other teams members	--	--	--	--	-.06	2.56	.84
5. Members of project teams primarily work by themselves	--	--	--	--	--	3.66	.79

**p < .01 * p < .05

Satisfaction with Work *(Js)*

Job satisfaction was included to examine the impact of the economy on finding enjoyment in the work performed. During 2010, the Architectural Billing Index (ABI), reflecting a nine to twelve month lag between architecture billings and construction

spending for nonresidential work, reached an all-time low when the index dropped below a value of 50. One's satisfaction with the work might have been impacted by the dismal forecasts for architectural services and the stress of wondering if one's job would be in jeopardy. For this study, participants were asked how satisfied they were with the work they do in their firms at a time when layoffs and declining revenues were impacting practice. Nearly 92% were moderately to extremely satisfied, with 8% indicating little satisfaction, despite the economic environment. Study participants appeared quite positive about their work during a period of time when architectural practices faced challenges in obtaining work with flat or no demand for design services indicated by the ABI.

As a discipline in which team collaboration is a primary model for the delivery of services, especially on large scale projects, which are a major source of revenue for large firms, job satisfaction has been linked to creativity. Architects who collaborate in the workplace create novel outcomes by engaging in constructive and inspiring conversations and creative brainstorming reinforcing respect, trust, and appreciation (Pressman, 2009). Despite the economic outlook, participants appeared to be very satisfied with their jobs suggesting a potential for disconnect between job satisfaction and workplace stress; worries about losing one's job may not effect satisfaction with the work in which one is engaged.

Relationship among *Wv* and *Js*

To explore a relationship between workplace values and job satisfaction, a correlation was computed. Job satisfaction as a nominal variable requires use of statistics for nonparametric variables. The Spearman rho statistic was calculated, r_s (76) = .30, p =

.007; individuals satisfied with their job perceived the firm places importance on quality, innovation, cooperation, and wide participation in decision-making. R^2 accounted for 9% of the variance and according to Cohen (1992), this would be a small effect size for studies in this area.

Simple regression was conducted to investigate how well job satisfaction could predict workplace values. The results were statistically significant, $F(1, 74) = 11.48$, $p = .001$. The identified equation to understand this relationship was workplace values = 2.07 + .35* (job satisfaction). The adjusted R^2 value was .123; this indicates that 12% of the variance in workplace values was explained by job satisfaction, according to Cohen (1992), a small effect size and therefore, appropriate to maintain *Wv* and *Js* as discrete variables.

Value and Creativity

Five measures were examined to look at the relationship between value and creativity; Pearson correlations were computed for *Cs*, *Cfr, CWEr, Js*, and *Wv*. Each of the variables and composite variables met assumptions for linearity and normality of distribution. Table 23 shows six of ten correlations were significant. The strongest positive correlation, with much larger than typical effect size (Cohen, 1992), was between the creative work environment (*CWEr*) and creativity as a part of the job or firm or firm (*Cfr*), $r (72) = .89$, $p < .001$. Individuals embracing factors of the creative work environment (*creativity of the job or firm or firm, challenging work, leadership support and feedback, organizational encouragement, resources* and *intellectual stimulation*) perceived the firm placed importance on quality, innovation, cooperation and wide

participation in decision-making; $R^2 = .78$. Additional positively correlated pairs, with larger than typical effect sizes (Cohen, 1992), included:

- Creative workplace environment with workplace values, r (72) = .77, $p < .001$;
- Creativity as a part of the job or firm or firm with workplace values, r (72) = .69, $p < .001$; and
- Creativity as a part of the job or firm or firm with job satisfaction, r (72) = .60, $p < .001$.

To a lesser extent, the creative work environment was correlated with job satisfaction, r (72) = .53, $p < .001$; $R^2 = .28$, a medium effect size (Cohen. 1992) and job satisfaction was correlated with workplace values, r (72) = .36, $p < .001$; $R^2 = .14$, a small effect size (Cohen. 1992).

Table 23
Intercorrelations, Means, and Standard Deviations for Four Creativity Variables and Two Value Variables (N = 70)

Variable	1	2	3	4	5	*M*	*SD*
1. Self-evaluation of creativity (*Cs*)	--	-.05	.04	-.07	.18	1.60	.57
2. Creativity as a function of the job or firm (*Cf*r)	--	--	.89**	.60**	.69**	2.32	.60
3. Creative work environment (*CWEr*)	--	--	--	.53**	.77**	2.30	.52
4. Satisfaction with work (*Js*)	--	--	--	--	.57**	1.63	.61
5. Workplace values (Wv)	--	--	--	--	--	2.66	.61

** $p < .01$

The next consideration investigated the best predictor of the creative work environment *(CWEr)* from *Js* and *Wv*; simultaneous multiple regression was conducted with means, standard deviations, and intercorrelations found in Table 24.1. The combination of variables to predict *CWEr* from self-evaluation of creativity (*Cs*), creativity as part of the job or firm (*Cfr*), job satisfaction (*Js*), and workplace values (*Wv*)

was statistically significant, F (4, 67) = 93.79, $p < .001$. The beta coefficients are presented in Table 24.2. Note creativity as a part of the job or firm or firm (*Cfr*) and workplace values (*Wv*) significantly predict the creative work environment (*CWEr*) when all four variables are included. The adjusted R^2 value was .839 indicating 84% of the variance in the creative work environment *(CWEr)* was explained by the model. According to Cohen (1992), this is a larger than typical effect size.

Table 24.1
Means, Standard Deviation, and Intercorrelations for the Creative Work Environment and Predictor Variables (N = 71)

Variable	*M*	*SD*	*Cs*	*Cfr*	*Js*	*Wv*
Creative work environment (*CWEr*)	2.30	.52	.04	.89**	.53**	.77**
Predictor variable						
1. Self-evaluation of creativity (*Cs*)	1.60	.57	--	-.05	-.07	.18
2. Creativity as a part of the job or firm or firm (*Cfr)*	2.32	.60		--	.58**	.69**
3. Job satisfaction (*Js*)	1.63	.61			--	.37**
4. Workplace values (*Wv*)	2.66	.61				--

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

Table 24.2
Simultaneous Multiple Regression Analysis Summary for Workplace Values and Job Satisfaction Predicting Creative Work Environment (N = 71)

Variable	*B*	*SE*	*β*
Self-evaluation of creativity (*Cs*)	.02	.04	.02
Creativity as a part of the job or firm or firm (*Cfr)*	.57	.06	.66**
Job satisfaction (*Js*)	.03	.05	.04
Workplace values (*Wv*)	.25	.06	.30**
Constant	.20	.13	

Note: $R^2 = .50$; F (2, 67) = 34.12, $p < .001$.
** $p < .01$ * $p < .05$.

Within the parameters of this study, the relationship between creativity and values in architectural practice can be best described as the perception that individuals hold about creativity as a part of the job or firm or firm as manifested through actions to produce and encourage creativity. Creativity can also be described as values manifested by the firm through recognition, perceived reputation, and collaborative decision-making.

Finally, multivariate analysis of variance (MANOVA) was conducted to assess if there were differences among respondents' five levels of job satisfaction (*Js*) on a linear combination of job satisfaction and the creativity variables for *Cs, Cfr,* and *CWEr.* Box's Test of Equality of Covariance Matrices indicated no significant differences between covariance matrices; however, several relatively high correlations suggested the possibility of multicollinearity. The analysis was conducted without *Cfr* and bivariate scatterplots were checked for multivariate normality. No significant differences were found by level of job satisfaction.

Value Disciplines (*Vd*)

In this study, a stronger association with product leadership's operating model would theoretically reinforce a market leadership discipline valuing creativity and innovation to a greater degree than Treacy and Wiersema's (1995) models for operational excellence and customer intimacy. Firms participants assessed as valuing creativity in their work were expected to demonstrate a significant correlation with the product leadership discipline. In Eskildsen et al.'s (1999) study, values, as a component of organizational learning, were found to be a mediating influence between business excellence (performance) and organizational creativity. Statistical analysis examining relationships of value disciplines to performance are covered in a later section.

Nine value statements developed to relate to one of three operating models were presented to study participant to test Treacy and Wiersema's value disciplines relationships to creativity. A negative relationship with operational excellence is anticipated and will be examined later in the analyses.

Value discipline (*Vd*) indices. Treacy and Wiersema's (1995) study of market leadership characteristics suggested focused discipline is crucial in defining three distinct value disciplines – product leadership (*PL*), operational excellence (*OE*), and customer intimacy (*CI)*. From consulting observations (p. ix), the authors propose each discipline suggests a primary value model shaping an organization's success in achieving market leadership comprised of organizational culture, management systems, core processes, organizational structure, and an organization's approach to information management.

Frequency distributions for each of three value statements developed to represent one of the three value discipline were analyzed (see Table 25). The items for product leadership *(PL)* and operational excellence *(OE)* demonstrated acceptable ranges of normally distributed values. Two of the three items (*050, 054*) developed for the customer intimacy (*CI*) index revealed skewness statistics (1.02 to 1.08) exceeding the range for approximately normal distributed values (< 1).

Examining the means, medians, and modes for *CI* indicated values were approximately equal supporting a decision to consider the two skewed items as approximately normally distributed; items with moderate skew (used in developing a composite index for *CI*), can be used as dependent variables (Morgan et al., 2007, p. 60). Boxplots and histograms were generated to visually examine the customer intimacy items; *CI* had outliers but no extreme cases. A majority of respondents to the *CI* measures

were very positive with scores falling between strongly agree and agree at mid-point between values 1.0 and 2.0.

Table 25
Value Disciplines for PL, OE, and CI

Product leadership (*PL*)	*N*	*M*	*SD*	Variance	Skewness Statistic	Skewness Std. Error
Item 048 This firm has a go for it attitude and an out of the box mindset	83	2.29	.848	.720	.384	.264
Item 052 This firm continually practices state-of-the-art procedures in architectural practices	83	2.40	.868	.755	.381	.264
Item 053 While cost is an important consideration, project results and creativity matter most	83	2.38	.895	.801	.302	.264
Product leadership (composite index)	83	2.35	.651	.425	.167	.264
Operational excellence (*OE*)						
Item 049 This firm focuses on lowest cost for services to achieve profit	83	3.17	1.068	1.142	-.407	.264
Item 055 This firm provides reliable services at a competitive price	83	1.99	.943	.890	.649	.264
Item 056 Improving customer value achieves superior profitability	83	2.07	.907	.824	.256	.264
Operational excellence (composite index)	83	2.41	.578	.334	.198	.264
Customer intimacy (*CI*)						
Item 050 Building client relationships requires the best solution to meet client needs	83	1.65	.772	.596	1.026	.264
Item 051 Providing a total solution is the most important objective in delivery of a project	83	2.00	.826	.683	.531	.264
Item 054 Customer satisfaction is paramount in the way clients are managed	83	1.70	.760	.579	1.083	.264
Customer intimate (Composite index)	83	1.78	.642	.413	.920	.264

Reliabilities for *PL, OE,* and *CI*. Cronbach's alphas were computed to examine reliabilities for each index: for the *PL* index, .61; for the *OE* index, .13, and for *CI*, .75

and was considered acceptable. The *PL* index demonstrated borderline reliability; the *OE* index was not acceptable suggesting continued examination using exploratory factor analysis.

Value discipline validity. EFA examined construct integrity and internal reliability of the items to be combined for value discipline indices to inform decisions prior to further statistical analyses (Agresti & Findlay, 1997, p. 630). EFA was initially favored over Principal Components Analysis (PCA) to gain an understanding of patterns of interrelationships of underlying constructs versus data reduction; changes made in the adaptation process to accommodate focus, level of measurement and context required composite indices be informed by theoretical concerns in addition to being reliable and valid prior to further statistical computation. Conditions for factor analysis required some measure of relationship among variables and number of items (9) greater than number of study participants (83); these conditions were met. Assumptions also included normality, independent sampling, and linearity, with moderate correlation among variables (Leech, Barrett, & Morgan, 2008, pp. 58-59). The nine measures were anticipated to load appropriately on three factors.

Principal axis factor analysis with varimax rotation was conducted to assess latent structures of the nine items intended to represent the value discipline indices. Three factors were requested, based on items designed to index: product leadership, operational excellence, and customer intimate. After rotation, attempts to extract three factors were unsuccessful despite a KMO measure of sampling adequacy (.69) and significance for Bartlett's Test of Sphericity, $p < .001$.

Association among Vd variables. Pearson correlations were computed for the nine items representing *PL*, *OE*, and *CI* to further examine associations among the nine measures. Table 26 shows 12 of 36 items were correlated and statistically significant. The strongest positive correlation, a somewhat typical effect size (Cohen, 1992), were found in the relationships *between CI2* and *OE2*, and *OE3* and *CI3*, r (81) = .46, $p <$ .001.

Table 26
Intercorrelations, Means, and Standard Deviations for Value Discipline Variables (N = 83)

Value discipline	PL1	OE1	CI1	CI2	PL2	PL3	OE2	OE3	CI3	*M*	*SD*
PL1:This firm has a go for it attitude and an out of the box mindset	--	.15	.02	.19	.45**	.33**	.02	.03	-.28*	2.29	.85
OE1:This firm focuses on lowest cost for services to achieve profit	--	--	-.02	-.12	-.02	.02	-.15	.29**	-.02	3.17	1.07
CI1:Building client relationships requires the best solution to meet client needs	--	--	--	.06*	.18	.03	.08	.28**	.37**	1.88	2.26
CI2:Providing a total solution is the most important objective in delivery of a project	--	--	--	--	.27*	.08	.46**	.28**	.29**	2.0	.83
PL2:This firm continually practices state-of-the-art procedures in architectural practices	--	--	. --	--	--	.24*	.29**	.21	.09	2.40	.87
PL3:While cost is an important consideration, project results and creativity matter most	. --	--	--	--	--	--	.19	.01	.01	2.38	.89
OE2:This firm provides reliable services at a competitive price	--	--	--	--	--	--	--	.35**	.44**	1.70	.76
OE3:Improving customer value achieves superior profitability	--	--	--	--	--	--	--	--	.46** --	1.99	.94
CI3:Customer satisfaction is paramount in the way clients are managed	--	--	--	--	--	--	--	--	--	2.07	.91

** *p < .01;* * *p < .05 level*

- Respondents who perceived providing a total solution was the most important objective in delivery of a project (*CI2*) also perceived that their firm provided reliable services at a competitive price (*OE2*); this correlation suggested respondents perceived a strong connection between total solution and fair pricing demonstrating a client orientation which could define either *OE* or *CI* value disciplines.

- Respondents who perceived improving customer valued achieved superior profitability (*OE3*) also perceived customer satisfaction was paramount in the way clients are managed (*CI3*); in this relationship customer value and satisfaction were suggested as intertwined in service delivery.

Significant relationships were also found *within* items developed for the three value disciplines. For product leadership, the correlations were statistically significant among the three value statements (r = .45, .33, .24). For operational excellence, the correlations were statistically significant among two of the three value statements (r = .35, .29); the correlation between *OE1* and *OE2* (-.15) reflected a negative relationship potentially indicating a weakness in the statements.

- A firm's focus on *lowest cost* for services to achieve profit (*OE1*) may not have been seen as related to the concept of reliable services at a *competitive price* (*OE2*).

For customer intimacy, the correlations were also statistically significant among the three value statements (r = .37, .29, .06).

Significant relationships with other variables may have weakened relationships among the index measures for *PL, CI,* and *OE* suggesting the presence of multicollinearity.

Multicollinearity. Alternatives to reduce potential collinearity among variables were considered (Leech, 2008; Pedhauzer, 1997, pp. 317-318); reduction of variables, elimination of variables, reducing the number of indicators, collapsing variables into one measure, using a multi-stage analysis, and collecting additional data were each considered and rejected.

Principal components analysis (PCA) was conducted requesting an unrotated solution; assumptions were met for independent sampling, normality, linear relationships

between pairs, and variables correlated at a moderate level. After rotation, the first factor which seemed to index *CI* accounted for 31.9% of the variance, the second factor which seemed to index *PL* accounted for 18.5% of the variance, and the third factor which seemed to index *OE*, 12.9%.

Table 27 displays the items and factor loadings for the unrotated factors, with loadings less than .40 omitted to improve clarity. KMO = .69, similar to the EFA measure was modestly adequate; the Bartlett test was significant, $p < .001$.

Table 27
Principal Components Analysis with Factor Loadings for PL, CI, and OE

	Factor Loading			
	CI	PL	OE	Communality
OE3: Improving customer value achieves superior profitability	.78			.71
CI3: Customer satisfaction is paramount in the way clients are managed	.76			.63
CI1: Building client relationships requires the best solution to meet client needs	.73			.67
CI2: Providing a total solution is the most important objective in delivery of a project	.65			.52
PL1: This firm has a go for it attitude and an out of the box mindset		.85		.79
PL2: This firm continually practices state-of-the-art procedures in architectural practices		.67		.55
PL3: While cost is an important consideration, project results and creativity matter most		.61		.43
OE1: This firm focuses on lowest cost for services to achieve profit			-.88	.77
OE2: This firm provides reliable services at a competitive price			.60	.63
Eigenvalues	2.87	1.66	1.16	
% variance	31.93	18.53	12.89	

Note: Loadings < .40 are omitted.

***CI* and *OE* reliabilities.** Cronbach's alpha was computed to test internal consistency reliability for the new *CI* index. Cronbach's alpha for *CI* (.72) increased reliability of the index. The reliability model assumptions were violated with a negative value for *OE1* due to negative average covariance among items when combined with

OE2; therefore, for *OE*, one item derived from the PCA analysis (*OE2*) will be used in subsequent analyses.

Examining Value Disciplines and Creativity

Value disciplines (*PL, CI, OE*) and creativity self-evaluation (*Cs*). Bivariate correlations were conducted to investigate how well the choice of value discipline predicted one's self-evaluation of creativity. Low correlations were not statistically significant and not surprising since the individual self-evaluation measure for creativity did not correlate with other measures of creativity.

Value disciplines (*PL, CI, OE*) and creativity of the job or firm (*Cfr*). Simultaneous multiple regression was conducted to investigate the best predictors of *Cfr*. The means, standard deviations, and intercorrelations can be found in Table 28.1 The combination of variables to predict *Cfr* from the three value disciplines (*PL, CI, OE*) was statistically significant, $F(3, 71) = 18.41$, $p < .001$. The beta coefficients are presented in Table 28.2; *PL* significant predicts *Cfr* when all three variables are included. The adjusted R^2 value was .414, indicating 41% of the variance in *Cfr* was explained by the model. According to Cohen (1992), this is a larger than typical effect size.

PL appears to be a good fit for respondents identifying with the creativity to the extent to which creativity is part of the job or firm, supporting Treacy and Wiersema's (1995) product leadership value model embracing innovation as a characteristic of the organization's management system and culture (p. 90).

Table 28.1
Means, Standard Deviations, and Intercorrelations for Creativity of the Job or Firm and Predictor Variables (N = 75)

Variable	*M*	*SD*	*Cfr*	*CI*	*PL*	*OE*
Cfr	2.33	.59	--	..34	.64**	-.01
Predictor variable						
1. *CI*	1.85	.62		--	.29	.52**
2. *PL*	2.39	.66			--	-.10
3. *OE*	2.10	.92				--

**p < .01 * p < .05

Table 28.2
Simultaneous Multiple Regression Analysis Summary for CI, PL, and OE Predicting Creativity of the Job or Firm (N = 75)

Variable	*B*	*SEB*	*β*
CI	.20	.11	.21
PL	.51	.09	.57**
OE	-.04	.07	-.06
Constant	.82	.25	

Note: R^2 = .49; F (3, 69) = 24.62, p < .001
**p < .01 * p < .05

Value disciplines (*PL, CI, OE*) and *CWEr.* To investigate the best predictors of *CWEr*, simultaneous multiple regression was conducted. The means, standard deviations, and intercorrelations can be found in Table 29.1 The combination of variables to predict *CWEr* when all three value discipline were included was statistically significant, $F(3, 69) = 16.00$, $p < .001$. The beta coefficients are presented in Table 29.2. When all three value disciplines were included, *PL* significantly predicted *CWEr.* The adjusted R^2 value was .385, indicating 38% of the variance in *CWEr* was explained by the model; according to Cohen (1992) this is larger than medium effect size.

Table 29.1
Means, Standard Deviations, and Intercorrelations for Creative Work Environment (CWEr) and Predictor Variables (N = 73)

Variable	*M*	*SD*	*CI*	*PL*	*OE*
CWEr	2.30	.51	.38	.61**	.06
Predictor variable					
1. *CI*	1.83	.62	--	.31	.52
2. *PL*	2.39	.67		--	-.10
3. *OE*	2.08	.92			--

**p < .01 * p < .05

Table 29.2
Simultaneous Multiple Regression Analysis Summary for CI, PL, and OE Predicting Creative Work Environment (N = 72)

Variable	*B*	*SEB*	*β*
CI	.18	.10	.21
PL	.42	.08	.54**
OE	.01	.06	.01
Constant	.96	.22	

Note: $R^2 = .41$; F (3, 69) = 17.65, $p < .001$
**p < .01 * p < .05

Values represented by *PL* were anticipated to correlate with factors of the *CWEr.* A number of architectural firms model the customer intimacy value discipline; however, participants in this study embraced a stronger relationship with choice of the *PL* value discipline, with an anticipated negative correlation with operational excellence (*OE*). A negative relationship was interpreted as a value discipline focused on providing services at the lowest cost for a specific range of possibilities minimizing the need for creativity in achieving superior profitability; exactly opposite to architectural practices that broadly consider creativity and customer intimacy important in sustaining practice.

***PL* and creativity (*Cs, Cfr,* and *CWEr*).** A multivariate analysis of covariance (MANCOVA) was conducted to assess if there were differences between *PL* on a linear

combination of *Cs, Cfr, and CWEr.* Several correlations were .60 and above, again suggesting the need to examine the elimination of *Cfr* when *Cfr,* as a component of *CWEr,* was included in the index and analysis. Assumptions were met. A significant difference was found between covariance matrices, Pillai's trace = .946, F (9, 63) = 3.22, p = > .001, multivariate η^2 = .31. Examination of the coefficients for the linear combinations distinguishing *PL* indicated all three measures for creativity contributed to distinguishing the group; however, *Cfr* and *CWEr* contributed most. In particular, *Cfr* (β = -.1.31, $p >$ .001, multivariate η^2 = .08) and *CWEr* (β = -.50, $p >$ .001, multivariate η^2 = .02) contributed significantly toward discriminating *PL*; *Cs* did not significantly contribute. Follow-up univariate ANCOVAs indicated *Cfr* and *CWEr,* when examined alone, were significantly different for *PL*, F(9, 63) = 6.75, p > .001; and F(9, 63) = 6.33, p > .001, respectively.

Research Question [2] Analysis

2. Is there a relationship between value and creativity in architectural organizations?

A relationship was established between creativity measures and values as measured by the indices for workplace values, job satisfaction with the work, and the product leadership value discipline among study participants. What does this mean to architectural practitioners? The components of the *Wv* index include recognition, reward, reputation of the firm for innovation and superior performance, and shared decision-making. Creating a road map of where to start for HRD practitioners by examining the communication patterns used in the firm, how staff is appreciated and valued is certainly well within the venues of human resource development. Fifty-three percent of respondents agreed that people should be recognized and rewarded for superior

performance, with 43% responding the same for innovative work; perhaps defining or identifying examples of innovative work might be tied to superior performance. Similarly, 52% felt firm reputation for quality surpassed competitors, with 31% responding that the firm's reputation for innovation surpassed competitors. Often, information about firm competition is based on subjective information rather than on objective and factual information due to the competitive nature of the business and a lack of actual assessment by firm management.

As hypothesized, the product leadership index revealed statistically significant relationships to *CWEr* in terms of challenging work, leadership support and feedback, organizational encouragement and intellectual stimulation, and *Cfr*, the extent respondents' perceived creativity as part of the job function. Product leadership is the value discipline of choice for creative organizations.

Performance in Architectural Practice

Performance was conceptualized using a published list of annual revenues ranking architectural services (Architectural Record, 2009); three tiers were formed by an equitable division of firms (Tiers 1, 2, and 3).

Annual Revenue Tier

Firms participating in the study represented the middle (Tier 2) and bottom (Tier 3) tiers. Forty percent of respondents were firm participants from Tier 2 with 60% representing respondents from Tier 3. Table 30 shows Tier 2 participants significantly differed from Tier 3 on *years with firm* ($p = .005$) after conducting an independent

samples t-test. Effect size, d[18], was approximately .30 for *years with firm*, slightly larger than a small effect size.

Table 30
Comparison by Tier on Position, Years with Firm, Years in Practice, Gender, Education, and Annual Income

Participant	Tier	*M*	*SD*	*t*	*df*	*p*
Position				.39	88	.698
	Tier 2	2.19	.920			
	Tier 3	2.11	1.04			
Years with firm				-2.88	76.2	.005
	Tier 2	2.57	1.558			
	Tier 3	3.57	1.667			
Years in practice				-.54	86	.593
	Tier 2	5.00	2.270			
	Tier 3	5.28	2.422			
Gender				-.91	88	.367
	Tier 2	1.61	494			
	Tier 3	1.70	.461			
Education				-.08	81	.937
	Tier 2	5.91	2.810			
	Tier 3	5.96	2.906			
Annual income				.83	83	.409
	Tier 2	4.28	1.301			
	Tier 3	4.02	1.474			

Inspection of the two group means indicated the average mean for years with firm for Tier 2 was $M = 2.57$ and for Tier 3 was $M = 3.57$. The difference between means for years with firm was 1.0 on an 8-point scale; the assumption of equal variances was violated suggesting individuals in Tier 3 have been with their firms longer. Of the remaining demographic variables, no significant differences were found by tier.

To examine whether experience in practice differed between tiers, scatterplots were created and examined. The scatterplot for tier and years with firm showed weak correlation; a second scatterplot for tier and years in practice showed an even weaker relationship. Each of the three variables were normally distributed and the assumption of linearity was not markedly violated; the Spearman rho statistic was calculated for ordinal scores (tier).

[18] To calculate the value of "d", the mean of the control group was subtracted from the mean of the experimental group then divided by the pooled standard deviation.

Table 31 shows two of three correlations were significant. The positive correlation between tier and years with firm is considered a small effect size (Cohen (1992), r_s (85) = .30, p = .005. R^2 indicated approximately 9% of the variance in years with firm was predicted by tier. As might be expected, there was a statistically significant correlation between years in practice and years with firm, r (85) = .38, p < .001; R^2 = .144, indicating 14% of the variance in years in practice can be predicted by years with firm.

Table 31
Intercorrelations, Means, and Standard Deviations for Years with Firm, Tier, and Years in Practice (N= 87)

Variable	Tier	Years in practice	*M*	*SD*
1. Years with firm	.30**	.38**	3.23	1.67
2. Tier	--	.06	1.62	.48
3. Years in practice	--	--	5.18	2.36

** p = .01 level

Comparison of tier and creativity. Embedded in this study was the question of difference by tier across three measures for creativity. Because *Cs, Cfr,* and *CWEr,* and tier were normally distributed and the assumption of linearity was not markedly violated, Spearman rho correlations were computed to examine the intercorrelations of the variables. Table 32 shows that one of six pairs was significantly correlated. The strongest correlation with tier, which would be considered a very large effect size (Cohen, 1992), was with *CWEr,* r_s (71) = .85, p < .001.

Table 32
Intercorrelations, Means, and Standard Deviations for Tier with Measures for Creativity (N = 73)

Variable	*1*	*2*	*3*	*4*	*M*	*SD*
1. Tier	--	.03	.28*	.29*	1.70	.46
2. Cs	--		.01	.08	1.62	.59
3. Cfr	--	--	--	.85**	2.33	.60
4. CWEr	--	--	--	--	2.30	.51

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

Simple regression was conducted to investigate how well tier might predict the creative work environment (*CWEr*). The results were moderately significant $F(1, 71) = 7.62$, $p = .007$. The identified equation to understand this relationship was tier = 1.05 + .28* (*CWEr*). The adjusted R^2 value was .084, indicating only 8% of the variance in ranking tier was explained by *CWEr*. According to Cohen (1992), this is a smaller than typical effect size.

Simultaneous multiple regression was conducted using all three creativity variables to investigate best predictors of ranking tier. However, the combination of variables to predict ranking tier from *Cs, Cfr*, and *CWEr* was not statistically significant.

A multivariate analysis of covariance was conducted to assess differences between the two tier rankings on a linear combination of the creativity variables, *Cs, Cfr*, and *CWEr*. Assumptions of independence of observations and homogeneity of covariance were checked and met. Bivariate scatterplots were checked for multivariate normality. A significant difference was found, Wilks' $\Lambda = .90$, $F(1, 71) = 2.50$, $p = .067$, multivariate $\eta^2 = .31$. Examination of the coefficients for the linear combination distinguishing tiers indicated *CWEr* and *Cfr* contributed most to distinguishing the groups. Both *CWEr* ($\beta = -.35$, $p = .007$, multivariate $\eta^2 = .10$), and *Cfr* ($\beta = -.34$, $p = .025$, multivariate $\eta^2 = .07$) contributed significantly toward discriminating Tier 2 from Tier 3; no variables

significantly contributed to distinguishing Tier 3. Self-evaluation did not contribute significantly to distinguishing either tier.

Follow-up ANCOVAs 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. These are medium to large effect sizes (Cohen, 1992).

Mann-Whitney U tests were performed to compare creativity of Tiers 2 and 3. Tier 3 had significantly higher mean ranks (41.80) than Tier 2 (29.92) on creativity of the job or firm, $U = 418$, $p = .027$, $r = -.26$ which according to Cohen (1992) is a medium effect size; likewise, Tier 3 also differed in the mean ranks of the creative work environment (41.05) from Tier 2 (27.61), $U = 354$, $p = .013$, $r = -.29$, which according to Cohen (1992) is also a medium effect size.

Research Question [3] Analysis

3. Is there a relationship between performance (tier) and creativity in architectural organizations?

The relationship between performance and creativity was examined by analyzing annual revenue tier in relation to the creativity variables. The two tiers were quite similar demographically with the exception that individuals in Tier 3 may have been with their firms longer. 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, suggesting that Tier 2 respondents rated their perceptions of the work environment and how creative the perceived the job or firm higher.

Value and Performance in Practice

To examine relationships between values (*Js, Wv,* and *Vd*) and tier, Spearman rho was computed. Table 33 shows 4 of 15 items were significantly correlated. The strongest correlation, between job satisfaction and the product leadership value discipline, reflected a medium effect (Cohen, 1992), r_s (74) = .61, $p < .001$; respondents who rated job satisfaction high were likely to choose the value discipline of product excellence (*PL*) encompassing a 'go for it' attitude, state of the art practices, and project results and creativity mattering most. The index for workplace values significantly correlated with *PL* (r_s = .38), tier (r_s = .37) and *Js* (r_s = .31); each reflecting small effect sizes (Cohen, 1992). The negative sign was interpreted as an inverted relationship; in the relationship of *OE* to *Js, Wv,* and tier, respondents scoring higher on these three variables were likely to reflect lower scores on *OE*. *OE* reflected values in opposition to those of creativity, reaffirming value discipline choice of product leadership (*PL*) among these firm participants.

Table 33.
Intercorrelations, Means, and Standard Deviations for Js, Wv, Vd, and Tier (N = 76)

	1	2	3	4	5	6	M	SD
Js	--	.31**	-.05	.18	.61**	-.18	1.63	.63
Wv	--	--	.37**	.27*	.38**	-.22	2.65	.61
Tier	--	--	--	-.10	.15	-.15	1.71	.45
CI	--	--	--	--	.17	-.06	1.92	.65
PL	--	--	--	--	--	-.03	2.37	.66
OE	--	--	--	--	--	--	3.12	1.07

**p < .01 * p < .05

Since product leadership was shown to be significantly correlated with indicators for the creative workplace, the best predictors of *PL* from *Js* and *Wv* were examined next. Simultaneous multiple regression was conducted with means, standard deviations, and

intercorrelations shown in Table 34.1. The combination of variables to predict product leadership from job satisfaction and workplace values was statistically significant $F(2, 73) = 25.56$, $p < .001$. The beta coefficients are presented in Table 34.2. Both variables predicted product leadership with an adjusted R^2 value of .396, indicating 39% of the variance in product leadership (*PL*) was explained by the model; according to Cohen (1992), this would be slightly greater than a medium effect.

A multivariate analysis of covariance (MANCOVA) was conducted to assess if there were differences between *PL* on a linear combination of workplace values (*Wv*) and job satisfaction (*Js*); assumptions were met. A significant difference was found, Wilks' $\Lambda = .420$, $F(9, 66) = 3.92$, $p < .001$, multivariate $\eta^2 = .35$. Both variables (*Js, Wv*) contributed significantly to product leadership (*PL*). Follow-up ANCOVA indicated job satisfaction (*Js*) and workplace values (*Wv*), when examined alone, were significantly different for respondents on product leadership; for *Js*, $F(9, 66) = 6.42$, $p < .001$; and for *Wv*, $F(9, 66) = 3.20$, $p = .003$, respectively; job satisfaction contributed more strongly to the product leadership value discipline.

Table 34.1
Means, Standard Deviations, and Intercorrelations for Product Leadership and Value Predictor Variables (N = 76)

Variable	*M*	*SD*	*Wv*	*Js*
Product leadership (*PL*)	2.38	.66	.40**	.61**
Predictor variable				
1. Workplace values (*Wv*)	2.65	.61	--	.36**
2. Job satisfaction (*Js*)	1.63	.63		--

**p < .01 * p < .05

Table 34.2
Simultaneous Multiple Regression Analysis Summary for Value Variables (Wv, Js) Predicting Product Leadership (N = 76)

Variable	*B*	*SEB*	*β*
Workplace values (*Wv*)	.22	.10	.19*
Job satisfaction (*Js*)	.57	.10	.54**
Constant	.87	.27	

Note: R^2 =.39; F (2, 73) = 25.56, $p < .001$.
**$p < .01$ * $p < .05$

A Mann-Whitney *U* test was performed to further compare Tiers 2 and 3 participant responses on values for *Js, Wv,* and *PL.* Tier 3 participants significantly differed on *Wv* with higher mean ranks (43.72) than Tier 2 (25.68), $U = 312$, $p = .001$, $r = -.35$; according to Cohen (1992) a medium effect size. However, Tiers 2 and 3 did not differ on job satisfaction (*Js*) with mean ranks 45.20 and 42.49, respectively, $U = 809$, $p = .587$, $r = -.59$; and product leadership (*PL*) with mean ranks 36.52 and 44.94, respectively, $U = 624$, $p = .124$, $r = -.17$.

Research Question [4] Analysis

4. Is there a relationship between value and performance in architectural organizations?

Examining the relationship between values and performance suggested job satisfaction (*Js*) is strongly correlated with the value choice of product leadership (*PL*) in having a 'go for it' attitude, practicing state of the art procedures, with project results and creativity mattering most. To a lesser extent but still significant, workplace values (*Wv*) expressed as employee recognition and reward for innovation and performance, the reputation of the firm for quality and innovation surpassing competitors, and innovation were important values to those participants choosing the product leadership (*PL*) value discipline.

Workplace values were significant when examining differences between tiers, with Tier 3 scores significantly higher than Tier 2; Tiers 2 and 3 did not differ on job satisfaction or product leadership suggesting participants from firms in Tier 2 value to a greater degree the extent to which they place importance on quality, innovation, cooperation, and wide participation in decision-making in comparison to firms in Tier 3.

Firm principals and HRD practitioners could take action to reinforce job satisfaction by publicizing creative accomplishments, ensuring the technology and practices reflect state of the art, not old technologies and approaches, and continual awareness of the competition to position the firm to surpass the competition in a manner that can be translated to staff.

Predicting Performance in Architectural Practice

Having identified a relationship between measures of creativity and values, their combined ability to predict tier ranking was examined. Multiple regression was conducted to determine the best linear combination of value and creativity measures for predicting performance. Assumptions for linearity, normally distributed errors, and uncorrelated errors were checked and met for *Cs, Cfr, CWEr, Js, Wv, CI, PL, OE,* and tier. Variable transformations were required and conducted to correct multicollinearity with tolerances low[19] for all variables (with the exception of *Cs* (R^2 = .122) as noted below:

- *CWEr* was included without *Cfr*;
- *Cfr* was then eliminated;
- Workplace values were deleted and replaced with combined items:
    - *Wv1 + Wv4 = Wv11*

[19] Values less than 1 indicate low tolerances; in this case 1 - .122 = .878 or indicative of low tolerance for mutlicolllinearity.

    - *Wv5 + Wv3 + Wv2 = Wv12*
    - *Wv7 = Wv6 + Wv8 = Wv13*
    - *Wv9*
    - *Wv10*
- *Wv11* and *Wv13* were eliminated (R^2 = .287, p = .021); and
- *PL* was deleted and replaced by *PL2* and *PL3*.

The means, standard deviations, and intercorrelations can be found in Table 35.1. This combination of variables significantly predicted tier ranking, $F(10, 64) = 2.89$, p = .005, with *CWEr* (w/out *Cfr)* and *Wv12* significantly contributing to the prediction. The adjusted R^2 value was .20; indicating 20% of the variance in tier ranking could be explained by this model. According to Cohen (1992), this is a small effect size. The beta weights, presented in Table 35.2, show job satisfaction contributed most to tier ranking; suggesting the greater the satisfaction, the higher the tier ranking.

Table 35.1

Means, Standard Deviations, and Intercorrelations for Tier and Predictor Variables (N = 75)

Variable	*M*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Tier	1.71	.46	.05	-.04	-.03*	-.22*	.30**	.16	.29	.33**	-.01	.26*
Predictor variable												
1. How creative *(Cs)*	1.64	.61	--	.01	.02	.01	.08	.18	.22*	.20*	.21*	-.10
2. Job satisfaction *(Js)*	1.64	.63		--	.14	-.15	.52**	.00	.32**	.33**	.50**	.36**
3. *CI*	1.91	.65			--	-.10	.18	.05	.37**	.25*	.27*	.15
4. *OE*	3.13	1.07				--	-.28**	-.26*	-.23*	-.14	.02	-.01
5. *CWEr* w/out *Cfr*	2.30	.52					--	.46**	.51**	.57**	.44**	.36**
6. Cooperation among employees is highly valued (*Wv9)*	2.00	.73						--	.41**	.26**	.08	.06
7. Reputation is as a very friendly place to work compared with other firms (*Wv10)*	2.16	.75							--	.43**	.42**	.29*
8. Wv5 + Wv3 + Wv2 (*Wv12)*	2.69	.78								--	.30**	.41**
9. This firm continually practices state-of-the-art procedures in architectural practices *(PL2)*	2.45	.87									--	.25*
10. While cost is an important consideration, project results and creativity matter most (*PL3*)	2.40	.88										--

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

Table 35.2

Simultaneous Multiple Regression Analysis Summary for Js, CI, OE, CWEr w/out Cfr, Wv9, Wv10, Wv12, PL2, and PL3 Predicting Tier (N = 75)

Variable	*B*	*SEB*	*β*
How creative *(Cs)*	.01	.08	.02
Job satisfaction *(Js)*	-.26	.10	-.36*
CI	-.13	.08	-.19
OE	-.07	.05	-.17
CWEr w/out *Cfr*	.25	.15	.28
Cooperation among employees is highly valued (*Wv9)*	-.11	.08	-.17
Reputation is as a very friendly place to work compared with other firms (*Wv10)*	.16	.08	.27
Wv5 + Wv3 + Wv2 (Wv12)	.11	.08	.19
This firm continually practices state-of-the-art procedures in architectural practices *(PL2)*	-.05	.07	-.10
While cost is an important consideration, project results and creativity matter most (*PL3*)	.10	.06	.19
Constant *(Tier)*	1.47	.35	

Note: R^2 = .31; $F(10, 64) = 2.89$, p = .005

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

Research Question [5a] Analysis

5a. How well does a combination of values and creativity predict performance in architectural practice? (*V : C : P*)

A combination of values (*Js, Wv, Vd*) and creativity (*Cs, CWEr w/out Cfr*) provided minimal predictability. *CWEr* did not contribute to predicting tier ranking as strongly as job satisfaction suggesting continued exploration for links between creativity and performance. Figure 6 identifies altered relationships from findings affecting the study's original conceptual framework and reflecting connections between job satisfaction and annual revenue tier.

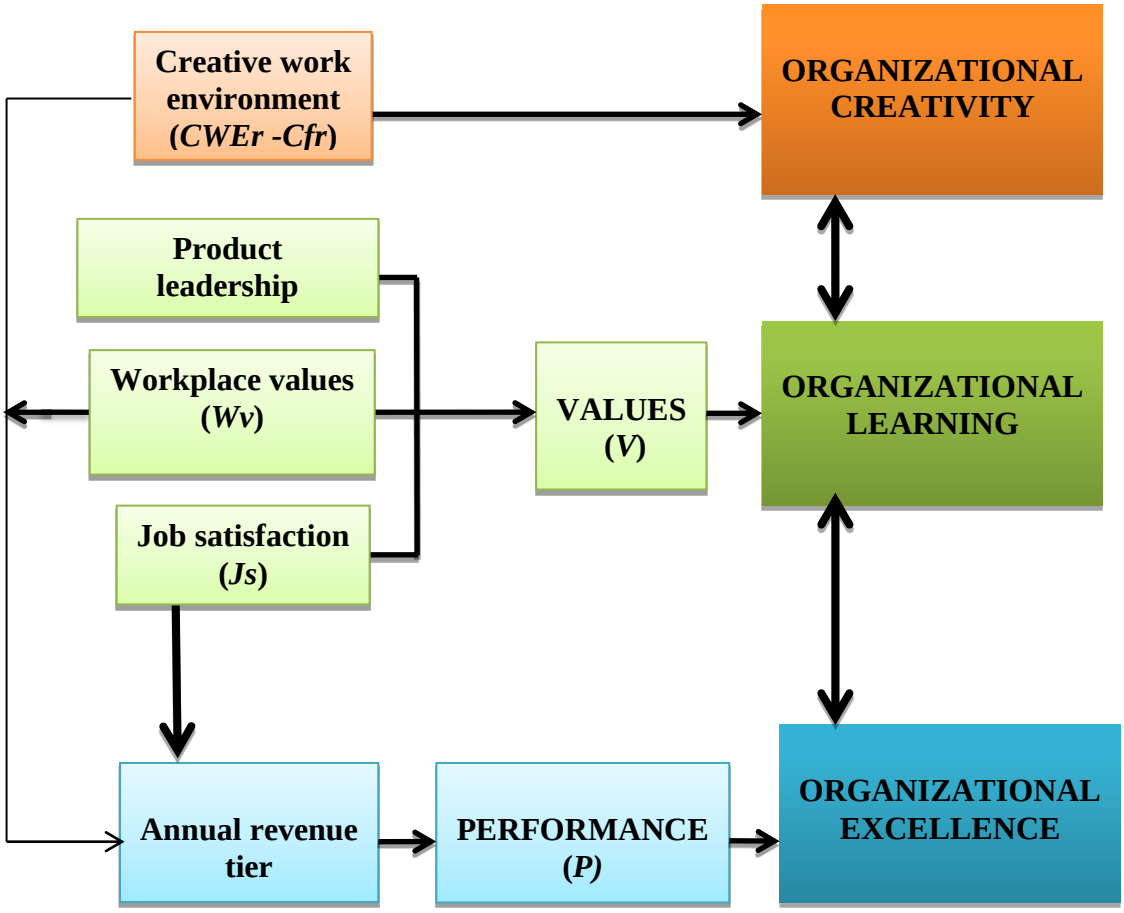

Figure 6. Creativity and values predicting performance as a component of organizational excellence

Predicting Organizational Creativity in Architectural Practice

Waight (2005) suggested creativity be explored through work values among other aspects of learning and performance pertinent to HRD. Workplace values and job satisfaction are measures necessary for organizational learning and were found to be significantly correlated in this study. Product leadership (*PL)* was also selected as the value discipline of choice by employees of these architectural firms. To explore how well a combination of value and performance measures predict creativity in architectural practice, given the strong relationship of *Cfr* and *CWEr*, the latter index with *Cfr* included was included in a regression model with values (*Js, Wv, PL)* and performance using annual revenue tier.

Examining the resulting correlations, similar issues with multicollinearity were also evident; therefore, transformed variables used in the previous regression were used in this analysis. Multiple regression was conducted to determine the best linear combination of *Js, Wv9, Wv10, Wv12*, *PL2*, *PL3,* and tier predicting creativity of the work environment (*CWEr* w/out *Cfr*). Assumptions of linearity, normally distributed errors, and uncorrelated errors were checked and met. The means, standard deviations, and intercorrelations are shown in Table 36.1. This combination of variables significantly predicted the creative work environment, $F(7, 67) = 15.69$, $p < .001$, with six of seven variables significantly contributing to the prediction. The adjusted R^2 value was .58 indicating 58% of the variance in the creative work environment explained by the model. This is a larger than typical effect size, according to Cohen (1992). The beta weights, presented in Table 36.2, suggest job satisfaction (*Js*), cooperation among employees (*Wv9*), and a combination of perceptions regarding the reputation for

innovation and quality surpasses competitors and innovation was of central importance (*Wv12*), each contributing the most to predicting the creative work environment.

Table 36.1
Means, Standard Deviations, and Intercorrelations for CWEr w/out Cfr and Predictor Variables (N = 75)

Variable	*M*	*SD*	1	2	3	4	5	6	7
CWEr w/out *Cfr*	2.30	.52	.52**	.46**	.51**	.57**	.44**	.36**	.30*
Predictor variable						.33**	.50**	.36**	-.04
1. Job satisfaction *(Js)*	1.64	.63	--	.00	.32**				
2. Cooperation among employees is highly valued (*Wv9)*	2.00	.73		--	.41**	.26**	.08	.06	.16
3. Reputation is as a very friendly place to work compared with other firms *(Wv10)*	2.16	.75			--	.43**	.42**	.29**	.29**
4. Wv5 + Wv3 + Wv2 (*Wv12)*	2.69	.78				--	.30**	.41**	.33**
5. This firm continually practices state-of-the-art procedures in architectural practices *(PL2)*	2.45	.87					--	.25*	-.01
6. While cost is an important consideration, project results and creativity matter most *(PL3)*	2.40	.88						--	.26*
7. Tier	1,71	.46							--

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

Table 36.2
Simultaneous Multiple Regression Analysis Summary for Js, Wv9, Wv10, Wv12, PL2, PL3, Tier Predicting CWEr w/out Cfr (N = 75)

Variable	*B*	*SEB*	*β*
Job satisfaction *(Js)*	.30	.08	.36**
Cooperation among employees is highly valued *(Wv9)*	.25	.06	.35**
Reputation is as a very friendly place to work compared with other firms *(Wv10)*	.02	.07	.03
Wv5 + Wv3 + Wv2 (Wv12)	.16	.06	.24**
This firm continually practices state-of-the-art procedures in architectural practices *(PL2)*	.09	.05	.14
While cost is an important consideration, project results and creativity matter most *(PL3)*	.01	.05	.02
Tier	.19	.10	.17
Constant (*CWEr w/out Cfr*)	.27	.21	

Note: $R^2 = .62$; $F(7, 67) = 15.69$, $p < .001$; *$p < .05$; **$p < .01$

Research Question [5b] Analysis

5b. How well does a combination of values and performance predict creativity in architectural practice? *(V : P : C)*

Three value measures (*Js, Wv9, Wv12)* exhibited the strongest influences on creativity in architectural practice (see Figure 7). Correcting for multicollinearity by deleting creativity of the job or firm (*Cfr*) suggested organizational creativity, in the context of this study, may be best described by factors of the creative work environment and value measures for product leadership, workplace values, and job satisfaction.

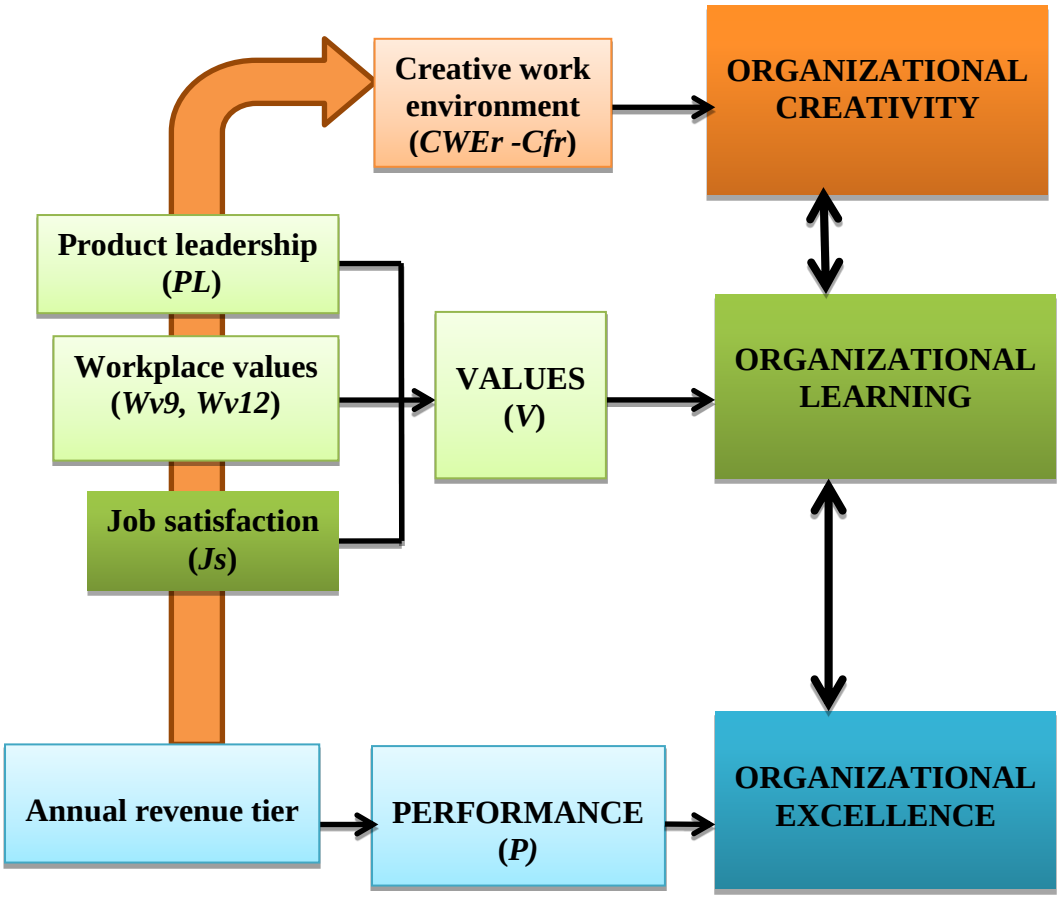

Figure 7. Values and performance predicting the creative work environment as a measure of organizational creativity

Implications for Organizational Creativity

Eight measures, developed as indices to describe the creative work environment (*CWEr*), were found to be significantly associated with creativity in architectural practice resulting from the regression equation. These measures included the perceived 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),* and index of workplace values (*Wv*), and job satisfaction (*Js*).

Multiple regression was conducted to determine the best linear combination of these variables to be significantly correlated with organizational creativity. Assumptions were checked and met for linearity, normally distributed errors, and uncorrelated errors. The means, standard deviations, and intercorrelations are found in Table 37.1. This combination of variables--*Cs, Oe, Ls, Is, Cw, PL, Wv, Js,* tier--significantly predicted the extent to which creativity was an integral part of the job function, the functioning of units, and functioning of the firm as a whole, $F(9, 62) = 24.63$, $p = < .001$, with intellectual stimulation (*Is*) and tier significantly contributing to the prediction. The adjusted R^2 value was .78; indicating 78% of the variance in creativity was explained by the model. According to Cohen (1992), this is a much larger than typical effect. The beta weights, presented in Table 37.2, suggest intellectual stimulation contributed most in predicting creativity of the job or firm with one's self-perception as creative, challenging work, and workplace values also contributing to this prediction. Figure 8 illustrates the regression model and relationships significantly influencing creativity of the job or firm (*Cfr*).

Table 37.1

Means, Standard Deviations, and Intercorrelations for Creativity of the Job or Firm (Cfr) and Predictor Variables (N = 72)

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
Creativity of the job or firm (*Cfr*)	2.32	.60	-.05	.65**	.60**	.75**	.67**	.65**	.69**	.58**	.28**
Predictor variable											
1. Self-evaluation (*Cs*)	1.60	.57	--	.11	.04	.13	-.11	.02	.18	-.07	.08
2. Organizational encouragement (*Oe*)	2.55	.68		--	.58**	.64**	.49**	.36**	.66**	.30**	.32**
3. Leader support and feedback (*Ls*)	2.27	.63			--	.56**	.43**	.39**	.70**	.41**	.33**
4. Intellectual stimulation (*Is*)	2.40	.70				--	.54**	.61**	.60**	.49**	.20*
5. Challenging work (*Cw*)	1.97	.52					--	.51**	.51**	.42**	.14
6. Product leadership (*PL*)	2.38	.66						--	.39**	.60**	.15
7. Workplace values (*Wv)*	2.66	.61							--	.37**	.35**
8. Job satisfaction (*Js*)	1.63	.61								--	-.04
9. Tier	1.71	.46									--

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

Table 37.2

Simultaneous Multiple Regression Analysis Summary for Cs, Oe, Ls, Is, Cw, PL, Wv, and Js Predicting Creativity of the Job or Firm (Cfr) (N = 71)

Variable	*B*	*SEB*	*β*
Self-evaluation (*Cs*)	-.13	.07	-13*
Organizational encouragement (*Oe*)	.12	.08	.13
Leader support and feedback (*Ls*)	-.01	.08	-.01
Intellectual stimulation (*Is*)	.23	.08	.27**
Challenging work (*Cw*)	.19	.09	.17*
Product leadership (*PL*)	.15	.08	.16
Workplace values (*Wv)*	.22	.10	.23*
Job satisfaction (*Js*)	.14	.08	.14
Tier	.10	.09	.09
Constant	.05	.22	

Note: $R^2 = .78$; $F(9, 62) = 24.63$, $p < .001$

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

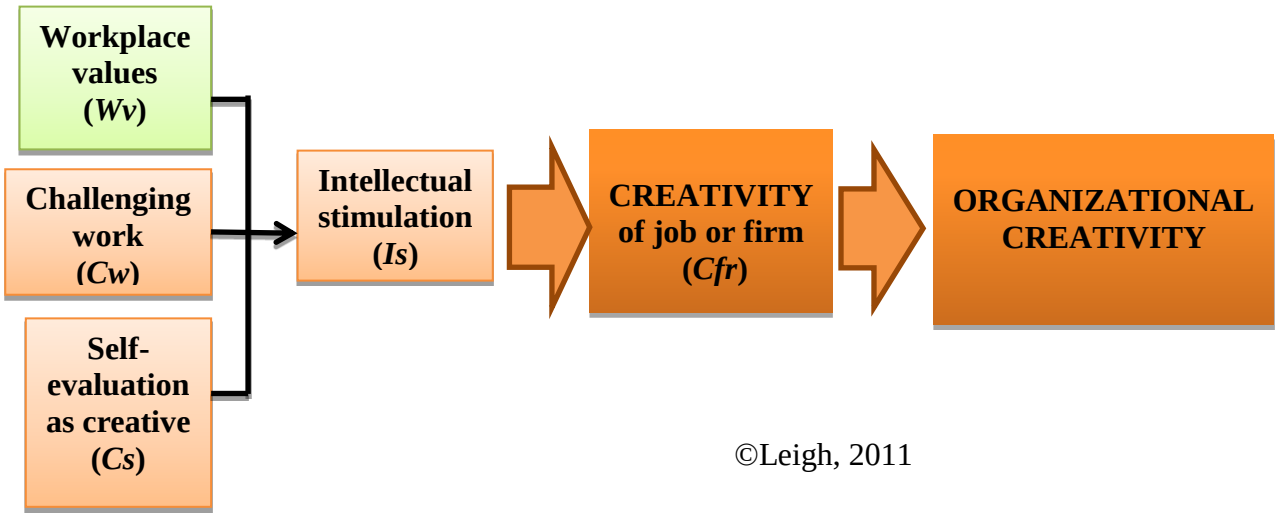

Figure 8. Influences on creativity of the job or firm in architectural practice

With high correlations among predictors suggesting multicollinearity, correlations were examined to explore combining variables or eliminating one or more variables from the regression model. Leadership support and feedback and organizational encouragement were eliminated, and product leadership and workplace values combined. The means, standard deviations, and intercorrelations are found in Table 38.1. 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. The adjusted R^2 value was .74. According to Cohen (1992), this is a much larger than typical effect size. The beta weights, presented in Table 38.2, suggest intellectual stimulation and *PL + Wv* contributed most to predicting *Cfr*, with challenging work (*Cw*) also contributing to this prediction.

Table 38.1
Means, Standard Deviations, and Intercorrelations for Creativity of the Job or Firm (Cfr) and Predictor Variables (N = 71)

Variables	M	SD	1	2	3	4	5	6
Cfr	2.32	.60	-.05	.76**	.67**	.58**	.29**	.80**
Predictor variable								
1. Self-evaluation (*Cs*)	1.60	.57	--	.13	-.11	-.07	.08	.12
2. Intellectual stimulation (*Is*)	2.40	.70		--	.54**	.49**	.20*	.73**
3. Challenging work (*Cw*)	1.97	.52			--	.43**	.14	.61**
4. Job satisfaction (*Js)*	1.63	.61				--	-.04	.59**
5. Tier	1.71	.46					--	.29**
6. *PL + Wv*	2.52	.53						--

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

Table 38.2
Simultaneous Multiple Regression Analysis Summary for Cs, Is, Cw, Js, Tier, and PL+Wv Predicting Creativity of the Job or Firm (Cfr) (N = 71)

	B	*SEB*	*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: $R^2 = .74$; $F(6, 65) = 35.81$, $p < .001$; **$p < .01$ * $p < .05$

The model in Figure 9 reflects predictors of creativity of the job or firm (*Cfr*) when all significant variables for creativity, values, and performance were considered. Challenging work and some dimensions of creativity did not combine to represent a single factor, as found in Rosenburg's (2007) examination of the KEYS constructs.

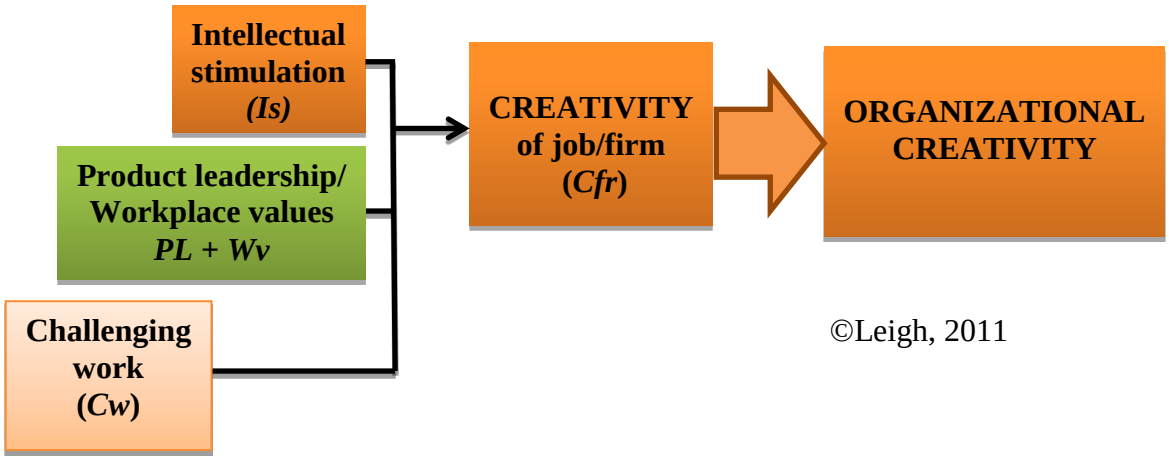

Figure 9. Intellectual stimulation, product leadership + workplace values, and challenging work as influencers on creativity of the job or firm as a component of organizational creativity

Summary

Researchers have focused on a variety of factors promoting or restricting creative activity (Gardner, 1994; Simonton, 2000). Shalley, Gilson, and Blum (2000) stressed the importance of complementary work environments inclusive of proximal (job complexity) and distal job factors. Jobs designed to be highly complex (p. 216), 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" (Unsworth et al., 2005).

The findings support study outcomes by Eskildsen et al. (1999) in which the relationship of three standardized latent variables for the creative organization, the learning organization and business excellence were examined. Significant relationships were identified between creativity of the job or firm and the value discipline of *product excellence* (e.g., go for it attitude, state of the art practice, project results and creativity mattering more than cost) and *work encouragement* (e.g., organizational encouragement

in terms of the extent to which values, rewards, and includes individual efforts related to creativity; how meaningful and demanding the work is). "If an organization wants to achieve business excellence it must create a change-oriented environment where the creativity of the employees is nurtured, developed and sustained through education, training, involvement and teamwork" (p. S529). Although, disparity of terms and definitions challenges comparison of findings in studies of organizational creativity, one can conclude elements of the creative work environment addressed in Eskildsen et al.'s conclusions are related to the findings in this study.

The study also confirmed findings from Amabile et al. (1996) and Hunter et al.'s (2007) studies. Five of the ten factors initially included in measures encompassing the creative work environment (*CWEr*) are reflected in the final model of organizational creativity (Figure 9).

Study findings did not support Amabile and Gryskiewicz (1989) indications of challenge and freedom stronger predictors of creativity than productivity (with challenge particularly important). Measures for freedom and productivity did not exhibit adequate correlations, reliabilities, or factor strength. Challenging work, as a component of work encouragement (*We)*, did, however, continue to demonstrate strong predictability, similar to the findings observed in the WEI.

Findings also 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 (1995) 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 operating models by using these indices to determine strength of *Vd* relationships. Alignment of these architectural firms with the operating model for product leadership (p. 90), for example, suggests:

- a culture where concepts are future driven, in which a go for it attitude prevails, and experimentation and out of the box thinking are the norm;
- an organic organization in which high skills abound in loose-knit structures;
- a decisive, risk oriented management system rewarding individual's innovation capacities that consider product life cycle profitability as opposed to first cost;
- person-to-person communication systems with technologies enabling knowledge management; and
- core processes that seek market exploitation, invention and commercialization.

Researchers have sought reliability in instrumentation used to evaluate whether or not an organization is truly creative or functioning in a creative manner. Similar indices were employed in this study and were found to lack internal consistency reliabilities. In Rosenberg's (2007) analysis of KEYS equivalence, he noted the challenge in interpreting results of the confirmatory factor analysis for the eight factor model developed by Amabile et al. (1996) reporting all items loading on corresponding scales. As the factor analysis carried out in this study illustrated, many items loaded on more than one factor or loaded on a single factor; a correlation matrix was not reported in Amabile et al.'s (1996) published study making comparisons unavailable regarding factor structure. In Rosenberg and Craig's (2006) analysis (as referenced in Rosenberg, 2007, p. 4), poor fit for an eight factor model was attributed to the large number of items (78); using the five highest loading items on each factor, the model fit was improved to an adequate level.

This logic reinforced this researcher's decision to return to the original indices reporting high alphas in the final analysis.

Given the lack of meaningful relationships found for interpersonal exchange, workload demands, and organizational roadblocks, further research comparing architectural practices to other larger scale creative and non-creative domains should be undertaken. The findings of this study question the factor structure of the KEYS instrument for use with creative organizations suggesting investigation of the roles of freedom, resources, and productivity in creative work environments such as architectural practice and the number of factors used to describe the creative work environment.

Respondents reported significant levels of creativity on each of the three dimensions of creativity; creative self-evaluation creativity, creativity of the job or firm, and in the creative work environment representing person, process and environment. However, one's self-perception as creative did not correlate consistently with other measures as did the creativity of the job or firm and measures of the creative work environment. Further exploration might raise the question of whether these firms are in fact creative or perhaps colorized by the perception that architectural practice must be creative or is expected to be creative.

Minor differences were detected in the responses from Tiers 2 and 3; greater depth of experience was indicated in Tier 3 firm participants but Tier 2 firm participants reflected slightly higher indications of creativity. Greater domain expertise over longer practice durations may negatively affect creativity unless the environment remains stimulating and supportive and the organization takes action to align their work with the value discipline driving business excellence. Although a strong relationship to

individuals' self-evaluation of creativity did not prove meaningful, creativity perceived as a component of the job or firm and the creative work environment were strongly correlated with the value discipline employing innovation to achieve market leadership (Treacy & Wiersema, 1995); product leadership.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

This research focused attention on architectural practice to examine relationships between three constructs—creativity, values, and performance—shaping organizational creativity. Employees of five firms, in design and non-design positions, located in major urban areas of the U. S., responded to an e-survey resulting in $N = 90$. Firms were randomly drawn as a stratified sample from *Architectural Record's* list in 2009 of the Top 250 Firms; only firms identifying 100% of their revenues from architectural services were considered for inclusion. Firms with other revenue sources (i.e., engineering, construction) were excluded to control for service delivery process. The purpose of the study was to identify factors contributing to organizational creativity as a foundation for future studies. A strong desire to produce evidence useful to architectural practitioners and HRD professionals shaped the design and selection of factors with the dual objective of establishing reliable measures for future research and identification of relevant factors affecting organizational creativity.

Challenges Encountered

Four challenges were revealed during the analysis of the data, enriching the research inquiry. First, a common definition of creativity continues to plague the research literature, obstructing comparisons of term and definition across disciplines. Definitions have followed individual approaches to research and domain contexts.

Second, a paradigmatic shift in thinking is necessary to embrace the integration of climate and culture as organizational context. Climate factors are affected by cultural norms and values present in the organization. Therefore, organizational creativity was conceptualized as the transitory point at which individual creativity meets group innovation. The culture of design found in architectural practice embodies a way of seeing the world, thinking out of the box, charrette mentalities, and the *flow* experience; certainly not the norm of most U.S. organizations but characteristic of creative design organizations. Design organizations are characterized by rapid project turnaround, deadlines requiring overtime work, and freedom in task management, and resource rich environments. These cultural considerations have an impact on perceptions of climate factors including workplace demands, freedom and autonomy, and resources found to be significant in many climate studies. Organizational context has received limited attention in the research literature, requiring this study to address its presence and acknowledge as an influencing factor for future research and exploration clarifying contextual transition and interstice beyond the boundaries of this study.

Third, the dualism of values as a cultural attribute and financial indicator required consideration. Value was conceptualized in the HRD research literature as a cultural attribute connected to organizational learning. Value disciplines, however, were conceptualized in the research design initially as performance indicators. In actuality they were values directed at market leadership depicted as shaping performance and were redirected in the analysis to be included with job satisfaction and workplace values.

Finally, performance models in HRD have focused on gap analysis, identifying given and future states of performance to achieve desired levels. Placing greater

emphasis on organizational absorptive capacity, for example, in the area of knowledge acquisition, shifts the source of performance measures toward external influences, and brings to the attention of architecture's executives and principals the role of strategic HRD. Research studies have indicated the need for more specific and broader measures for performance and productivity. Access to firms' financial indicators, however, would require close and careful examination of profits and competitors--proprietary information.

Instrument Reliability

As an exploratory study, reliable instrumentation would build a foundation for future inquiry into architectural practice in terms of values, market leadership and creativity, anticipating a connection to performance and profitability. The indices for product value disciplines showed promise, with product leadership (*PL*) significantly correlated with creativity measures. Operational excellence, as expected, was negatively correlated with *PL*; however, only one item resulted in utility for this construct. Identification of several other items for inclusion would strengthen *OE* as an index. The revised *PL* and *CI* measures can nonetheless serve as a foundation for further exploration.

The indices comprising the creative work environment were reduced from eleven to five: creativity, organizational encouragement, leadership support and feedback, intellectual stimulation, and challenging work, incorporating 28 items. These five indices provided a foundation on which to test additional variables in design and non-design work environments (e.g., the physical environment, work engagement, organizational structure).

Organizational Creativity Defined in Architectural Practice

Earlier research depicted organizational creativity as:

- a responsive and adaptive structure (Senge 1990);
- an interactive combination of creative persons, processes, situations, and products (Woodman et al., 1993);
- a continuous engagement of people in creative efforts leading to innovation (Vicari, 1998);
- an adaptive entity (Williams & Yang, 1999);
- inclusive of values (Waight, 2005); and
- as an antagonistic paradox with managers motivating optimal performance from business as usual while creating expectations of finding innovative ways to strengthen the organization.

Through the research conducted in this study, organizational creativity can be said to encompass each of these explanations. Organizational creativity in architectural practice as a creative organization producing creative products through creative services is broader, embracing work environments where creativity is an intangible expectation, work is challenging, encouragement is received from management and peers, and appropriate intellectual stimulation is accessible at the group level.

Organizational creativity and the eleven factors comprising an index of the creative work environment (*CWEr*), inclusive of creativity of the job or firm (*Cfr)*, confirmed and contradicted significant relationships identified in the studies by earlier researchers.

Creativity and the Creative Work Environment

The findings supported Hunter et al.'s (2007) study in which intellectual stimulation, challenge, and top management support were found to have large effect sizes and represent three of four top factors. However, contradictory to Hunter et al.'s findings, positive interpersonal exchange as the largest influencing factor, showed only

moderate correlation with *Cfr* (.42). There may be a difference in the way teamwork is perceived or understood and the way teams work together in organizations where collaborative work and integrated project delivery (IPD) are the way in which work is carried out within a context of creative expectation.

Freedom was significant but weak with measures for creativity (.36) and the index for freedom demonstrated weak reliability (α = .16); in Hunter et al.'s study (2007), a small effect size (R^2 = .129) was noted. Rosenberg's (2007) analysis of KEYS found no support for freedom, contradicting findings from Vithayathawornwong et al.'s (2003) study in which freedom was one of two factors indicative of creativity in the work environments of non-design organizations. Eighty-eight percent of respondents in this study agreed they decide when to take a break, with freedom to plan their own work (74%), and procedures to do the work (62%); freedom may not be a factor relevant to creativity, as a component of the creative work environment in architectural practice, or may be perceived as a factor of climate and not creativity.

Resources, in Rosenberg's (2007) analysis of KEYS, accounted for a small (5%) but significant percentage of the variance in Amabile et al.'s (1996) model for the creative work environment. In this study, the most significant correlations were with challenging work (.45) and a negative correlation with organizational roadblocks (-.38), confirming Amabile et al.'s (1996) early findings that threats or impediments to creativity would have negative relationships; significant in this study with organizational roadblocks (-.52) and less so for workload demands (-.06).

Although over 90% of respondents rated themselves as moderately to very creative, this perception of themselves as creative (*Cs)* was weakly correlated and not

significant with perceptions of creativity as an integral part of their job or the firm (*Cfr*) or with the factors of the creative work environment (*CWEr)* questioning the assumption these measures should have shown a relationship. However, the regression model shown in Figure 9 identified a significant influence of one's self-evaluation in predicting the perception of creativity as an integral part of their job or the firm (*Cfr*). This connection invites further study.

A majority of respondents agreed with statements about producing innovative projects (71%), tasks calling for people to be creative (75%), encouragement to be creative (62%), and the work of the firm conducive to personal creativity (52%). The index for *Cfr* demonstrated high reliabilities ($\alpha = .88$) and after revision to the items in the index based on factor loadings, .89. Correlations for *Cfr* with intellectual stimulation and challenging work, .70 and .67, respectively were the strongest; confirming Hunter et al.'s (2007) findings for intellectual stimulation and challenge, the second and third highest effect sizes in the meta-analysis. The revised index for *Cfr* included eight items encompassing creativity, organizational encouragement, and productivity similar to the number of factors in other research studies. *Cfr* consistently and strongly correlated with the index for the creative work environment (*CWEr*), with or without *Cfr*, and with all ten measures comprising the creative work environment (*CWEr)* and after elimination of positive interpersonal exchange, productivity, sufficient resources, freedom workload demands, and organizational roadblocks.

Wide variations were revealed in the reliabilities for the ten indices[20] selected to describe the creative work environment, contradictory to the research findings of other studies (Amabile et al., 1996; Hunter et al., 2007). The reliability of the summated

[20] With creativity, CWE was comprised of eleven indices.

indices for *CWE* was .70, with similar factor reliabilities reported in the WEI research (Amabile et al., 1996); the revised *CWEr* measure increased reliabilities, $\alpha = .87$. Challenges to the KEYS constructs derived from the WEI instrument (Rosenberg, 2007) suggested individual factor indices required examination of reliabilities before using the *CWE* index in subsequent analyses. In addition, certain factors were found to have large effect sizes in Hunter et al.'s (2007) study as mentioned above. Aside from eliminating flexibility and risk-taking from this analysis, the measures in this study considered similar contextual characteristics found in other climate studies.

Time pressure was represented as workload demands with fifty-three percent of respondents agreeing there was not enough time to carry out their work and 81% perceiving conflicting demands on time. In correlations between time pressure and creativity, statistically lower correlations were identified in the KEYS factors (-.07) similar in this study (-.06), confirming Ensor et al.'s (2006) observation that time pressure may not be a representative factor in the study of creative organizations, such as the advertising agency in the UK used in Ensor et al.'s study. Time pressure, while perceived to be present, is not a significant aspect to employees in organizations producing creative work, but an expectation.

Product Leadership

Theoretically, firms embracing product leadership should resonate with characteristics of creativity in the work environment, as a value discipline (Treacy & Wiersema, 1995) inviting continual innovation in design process and project product, requiring creative people and a work environment supportive of creativity. Top management would support and invite *pathbreaking* actions injecting passion and energy

into employee work attitude (Treacy & Wiersema, 1995, p. 90). Product leadership organizations operate with fluid management structures driven by highly competent talent, curious and energized to tackle impossible objectives. In demonstrating right to left thinking these organizations would set high overarching goals working backwards to achieve these goals through process outcomes (e.g., a project challenge to meet a .5 watt/SF energy utilization, or using buildings to teach about sustainability measures allowing individuals to experience the environment in a different way). Robust processes invite people to flex their muscles and minds minimizing barriers to creativity and providing efficient coordination accommodating disciplined inventiveness (p. 95). Firms executing the product leadership value discipline model recruit people with traits of humility and versatility as well as creativity (p. 97). The interchangeability of 'product' with 'service' as an outcome of the organization's business efforts and actions can be arguably defended in terms of the built environment as product, inviting application of Treacy and Wiersema's (1995) value disciplines.

The measures developed for the three value disciplines did perform as expected with product leadership strongly correlated with measures of creativity, operational excellence negatively correlated and customer intimacy weaker in its relationship to these firms. Although further exploration of the items used would be helpful especially for operational excellence, where one item was used after factor analysis, the initial structure of the indices was informative. Future testing with other design organizations, and especially those not included in the 190 firms from the top performing firms identified by *Architectural Record* would test the validity of the measures.

Open-ended Responses

Fifteen individuals chose to add comments at the conclusion of the survey. Factors employed to explore organizational creativity in the study were used to code these as similar themes. Of eighteen comments, recognition of creativity and the lack of leader support were each mentioned most often (22% of responses): "I would like to see creativity recognized and promoted equally or even above profitability. I would also like to see greater staff interest and involvement in project creativity." Another noted, "We have many different personalities and specializations here, so what one person values as creativity may be a bother and tedious to someone else." Still others felt that creativity was given lip service, "Those that would like to be more creative do not have the opportunity to because higher ups or management tend to do that part of projects without involving others." And, one comment indicated upper management had been in place for over 20 years and it was, "Business as usual." The emphasis on leadership support for creativity parallels the findings of the study by reiterating its importance to the participants from these firms.

Organizational encouragement, expressed as "I do think we all place a high priority on creativity in solving the problems we confront whether design, technical or financial," represented 16% of responses.

Workload demands and productivity each were mentioned by 11% of respondents suggesting that both are important to respondents from architectural practice and reinforcing the need to further explore these areas since their importance in this and other studies have been minimized. One individual commented "A large amount of work is

produced in a relatively short period of time with little break between projects. Most feel this is productive without feeling pressured."

Organizational roadblocks, freedom, and the physical environment each were mentioned by one respondent. "Using creativity is something that is talked about, but not followed through." Although the physical environment was not a component in this study certainly a domain in which aesthetics plays a significant role is affected by the surroundings; "The material (chairs, desks, interior décor, etc.) work environment is an important (sic) to get inspired and be creative." Finally, the impact of electronic communication was noted, "The biggest impediment to creativity now is phone calls and e-mails that are ignored by executive level people in the firm."

No one brought up issues that could be identified as indicators of challenging work, having sufficient resources, positive exchanges or intellectual stimulation.

HRD and Creativity

Creativity offers HRD the opportunity to embrace its dimensions as a component of HRD practice and learning, or to develop creativity as a fourth dimension of the discipline in addition to learning, performance, and change. The role of creativity in each of these existing pillars of the discipline has been touched upon in a very limited manner by academic research, and if the discipline is to be a force in the realm of creativity research, instrumentation, application and measurement, a considerable amount of research by HRD would need to be brought to the forefront of research priorities. Creativity is an intangible characteristic in the workplace; as such, focusing on other measurable aspects may be more in line with HRD interests. However, with creativity a required component of global business practice and management of creative capital, HRD

could address this component in terms of its value and critical perspective, building a foundational perspective regarding theory, principles and practices informing key issues surrounding the profession, research, policy and domain philosophy. Inclusion would strengthen the strategic influence of HRD professionals and integrate creativity within academic programs.

Limitations

Several factors may limit the generalizability of the findings. The period during which data was being collected, reflected discouraging economic conditions for architectural firms with the Architectural Billing Index falling below 50 for 9 of 12 months in 2010 potentially affecting participation in the study. None of ten firms invited to participate from Tier 1 participated.

Pre-testing of an earlier version of the instrument was done by hand; testing the instrument under the same conditions as study respondents may have changed the selection of items. Eskildsen et al. (1999) suggested the need to construct a more detailed questionnaire regarding the creative organization. In the future, additional constructs might be considered to enrich the results of investigation.

At one point the survey provider changed access to the URL; at least one firm attempted to access the site and could not requiring the researcher to request a new URL to provide to firms. There was no way to tell if individuals experienced trouble accessing the site and simply gave up.

The motivation for firm participation had to come from firm principals which may have influenced study buy-in and participation; gaining an understanding of ‘creativity’ in their respective practices was a strategic incentive for participation for the five firms

that did participate and the three firms that agreed but did not participate. But, what about the other 19 firms who did not respond to any communication regarding the study? There may be some aspect of creativity these firms may have had enlightened by their participation. Some firms may have perceived a lack of creativity as a characteristic of their firms, and preferred not to have this pointed out through employee responses.

Related to the decision to participate by a principal is the use of a gatekeeper to disseminate invitations to employees to participate. This may have introduced a level of control unintentionally in the study and affected response rate.

Finally, the instrumentation may have failed to tease out substantive information especially in the area of organizational context and performance; more data and modeling are needed to elaborate on these constructs.

Future Research

This research was conceptualized and drawn from issues encountered from the practice and teaching of design and a desire to examine the presence of creativity in practice. The study design focused heavily on organizational levels of analysis appropriate for an exploratory inquiry for factor identification to build a model of organizational creativity. Continued analysis of the data examining differences by firm can be conducted to investigate notable differences and similarities in the measures used in this study. In addition, continued refinement and testing of the value discipline indices would reinforce their use as a reliable instrument. Future research needs to return to this question to locate creative human capital within creative domains beyond architecture. Although earlier studies conducted by MacKinnon and colleagues (Hall & MacKinnon, 1969; MacKinnon, 1965) focused on identifying personality related attributes manifesting

creativity in individuals, cultivation of the sources within organizations at the individual firm level would be helpful to inform HRD professional development actions. Knowing what roles or levels of work may be the promoters of creativity has the power to invite or cause creative action affecting retention of individuals deciding to depart from practice and those choosing not to enter.

Data were collected through self-report; data generated from interviews using creativity, value, and performance measures as guides has the potential to obtain a richer contextualization of organizational creativity, reinforcing the findings of this exploratory investigation.

Further exploration of the relationships between organizational context, values, and creativity is needed to identify additional factors influencing the creative work environment, for example, technology and communication systems. Exploration of the complexities of the work environment in a holistic manner, rather than the piecemeal approach taken in the past, may offer insight into changing work patterns effecting creativity.

Longitudinal and on-site interviews would enrich understanding of the ways in which creativity surfaces in daily practice. As Gardner (1994) suggested, there are many ways creativity is demonstrated in practice, not just in the creation of solutions. New ways of contracting work, integrated project delivery (IPD) and building information modeling (BIM) are affecting practice management and delivery of services. We may not currently see what is in the future as the domain is challenged to create new methods to achieve the built environment but knowledge about creativity would target actions, guidelines and decisions affecting creativity's survival in organizations. The decision to

conduct the study drawing from large scale architecture practices offers an advantage to future inquiry to potentially make future comparisons with large scale non-design organizations.

Underlying suggestions for future research is the need to challenge the way architectural business is conceptualized to remove the stigma of long hours producing computer generated construction drawings. Practice is so much more although components of practice will likely continue to increase dependence on technology. What will architectural practice look like if project processes are based in virtual technologies? Theory as an outcome of exploratory investigation+ provides future opportunity to examine in greater detail holistic approaches to adapt the way creativity is perceived in creative practice.

Finally, creating and testing measures of a firm's absorptive capacity in architectural practice requires proprietary information available only to those within the practice or in consulting roles. The notion of economic links (Cohen & Levinthal, 1990; Zahra & George, 2002) to creativity would fuel demand for research-based tools to track performance. The use of stratification by tier tested differences in the study measures attributed to tier ranking; more detailed financial information would allow in-depth analysis of differences suggested in the findings.

Implications

The research conducted for this study established relationships between creativity, values, and performance, with findings providing a preliminary roadmap for architectural and HRD practitioners and academics to promote creativity as a way to improve and enhance performance in the architectural workplace. Strategies will need to address:

- job satisfaction;
- workplace values;
- product leadership value choice;
- intellectual stimulation
- challenging work; and
- self-perceptions of creativity.

These findings may seem "no brainers;" in fact, they define specific points of leverage a firm can explore to increase creativity to effect performance. As one participant commented "I found these questions very helpful on how to improve our firm…" reflecting interest in change aimed at organizational improvement in performance.

HRD could provide strategic planning guidance to define these constructs in terms of specific firm (organizational) contexts, conduct gap analysis to establish existing versus desired states, and establish a plan of action to manage change and bring about increased creativity. Searle and Ball (2003) found organizations failed to consistently translate the importance of innovation into coherent HR policies (p. 50); knowing where to look would allow HR policies to pointedly address, for example, challenging work, by asking what makes the work carried out challenging (new sources, inspired discourse, opportunities to take informed risks using expertise, seeking positive competition, skills development) and creating organizational opportunities to match the objective. In seeking new talent, asking prospective applicants how they make their work challenging may identify unique insights into "fit" within the organization and lead to greater diversity in staff rather than adding like individuals into the organization.

"Many of the principal's and shareholders have been here for more than twenty years; so it is 'business as usual'" raises the question of longevity of practice and its

association with creativity in architectural practice. Creative productivity has been observed to increase at the outset of a career and peak at different points within different domains (Simonton, 1975, 1984). Amabile (1996) suggested disciplinary knowledge, for example, as that embodied in a senior level architectural principal with 10-20 years of experience, would mitigate the negative effects of "too much knowledge" if organized effectively. However, findings in these firms suggest, the greater the number of years with the firm; the less creativity is perceived as a function of the job or firm. If senior management, especially in times of economic stress focuses attention less on creativity, what actions can promote and redirect practice leadership to support and provide critical feedback shown to impact creativity and at the same time re-energize senior staff toward heightened creativity?

Farson (2008), in *The Power of Design*, suggests that design can achieve great results affecting the challenges of our time; but harnessing the power of creativity is the first step in achieving a universal appreciation of the contributions made by architects and designers.

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APPENDICES

Appendix A. Creativity and Innovation Skills

Think Creatively

Use a wide range of idea creation techniques (such as brainstorming)

Create new and worthwhile ideas (both incremental and radical concepts)

Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts

Work Creatively with Others

Develop, implement and communicate new ideas to others effectively

Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work

Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas

View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Implement Innovations

Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur

(Partnership for 21st Century Skills; 2011)

Organizational Creativity

Created: April 10 2009, 4:10 PM

Organizational Creativity

Page 1 - Image

Consent

Organizational creativity: The relationship between the creative work environment and performance in architectural practice
You are invited to be in a research study examining factors and value disciplines affecting market leadership and subsequently firm productivity in architectural practice. Your firm was randomly selected from Architectural Record's 2009 listing of Top 250 firms. Please read through the following information. This study is being conducted by Dr. Donald L. Venneberg and Katharine Leigh, IIDA, Associate AIA, LEED AP, a doctoral student in the School of Education at Colorado State University, Fort Collins, CO. Background Information: Daily we hear in the news, financial, and trade publications, organizations must be more creative to embrace an increasingly global future; but how is this translated into action for architectural practices? How does creativity influence architectural practice? What actions should a firm take to successfully dominate market leadership in a period of unsurpassed economic turmoil? The purpose of this study is to look at your firm's reported annual revenues, choice of values selected by staff, and descriptions of the work environment to understand how firms might use creativity to improve performance and be more competitive.
Procedures: If you agree to be in this study, we will ask you to do the following:

check the box below indicating you understand and agree with the information provided in this consent form and that you wish to take the survey; and

complete the survey asking you about your work experience (approximately 20 minutes).

Colorado State University

Page 2 - Heading

Risks and Benefits of Being in the Study: This study has minimal risks. It is not possible to identify all potential risks in a survey procedure, but the researchers have taken reasonable safeguards to minimize any known and potential, but unknown, risks. There are no direct benefits to you for participating. However, it is hoped that this study will offer benefits to architectural design practice and education through what it reveals about the factors evident in creative work environments, value disciplines and productivity within those environments. Confidentiality: Your responses, information and the records of this study will be kept private. All data will be processed by Zoomerang, the survey provider; no identification information will be provided to the researchers or be linked to your name or email by the survey provider. In any report we might publish, no information will include any information that will make it possible to identify an individual participant or specific firm.

Voluntary Nature of the Study: Your participation in this study is entirely voluntary. Your decision whether or not to participate will not affect your current or future employment, and will not be shared individually with your firm. If you decide to participate, you are free to withdraw at any time without affecting these relationships. If at any point you feel that you would like to withdraw from the study, simply close the survey and exit from the URL.

Page 3 - Heading

Contacts and Questions: The researchers conducting this study are Dr. Don Venneberg and Katharine Leigh, IIDA, Associate AIA, LEED AP. You may ask any questions you have now. If you have questions later, you may contact Katharine Leigh at: leigh@cahs.colostate.edu.
You may also contact the Research Integrity and Compliance Review Office at Colorado State University: Janell Barker, Human Research Administrator, (970) 491-1655. You may print this form to keep for your records.
This consent document was approved by the Colorado State University Institutional Review Board for the Protection of Human Subjects on November 1, 2009.
Human Subjects#: 09-1076H
DO NOT PUT YOUR NAME ON ANY PART OF THE SURVEY! Thank you!

Page 4 - Question 1 - Choice - One Answer (Drop Down) [M

AN ANSWER TO ONE OF THESE TWO CHOICES IS REQUIRED TO CONTINUE THE SURVEY

- ○ I understand this consent form and consent to participate. Take me to the next part of the survey.
- ○ I do not choose to give my consent at this time. Exit me from this survey. [Skip to End]

Page 4 - Question 2 - Choice - Multiple Answers (Bullets) [M

Firm Name

- ☐ Firm A
- ☐ Firm B
- ☐ Firm C
- ☐ Firm D
- ☐ Firm E

Page 6 - Question 3 - Choice - Multiple Answers (Bullets)

1. My position with the firm is (check all that apply):

- ❑ Group A: Chief Executive/Operating/Financial Officer, President, Principal-Owner, Partner
- ❑ Group B: Vice President, Director, Board-member, Regional Director, Division Director
- ❑ Group C: Department Head, Manager, Senior Professional Staff, Senior Associate, Studio Director
- ❑ Group D: Office Manager, Business Development, Marketing
- ❑ Group E: Associate
- ❑ Group F: Project Manager/Director
- ❑ Group G: Project Architect
- ❑ Group H: Project Interior Designer
- ❑ Group I: Interior Designer
- ❑ Group J: Architect
- ❑ Group K: Architect Intern
- ❑ Group L: Interior Design Intern
- ❑ Group M: Student Intern
- ❑ Group N: Other, please specify

Page 7 - Question 4 - Choice - Multiple Answers (Bullets)

How many years with this firm?

- ❑ less than 1 year
- ❑ 1-5 years
- ❑ 6-10 years
- ❑ 11-15 years
- ❑ 16-20 years
- ❑ 21-25 years
- ❑ 26-30 years
- ❑ over 31 years

Page 8 - Question 5 - Choice - Multiple Answers (Bullets)

Gender

- ❑ Female
- ❑ Male

Page 9 - Question 6 - Rating Scale - One Answer (Horizontal)

How creative are you?

Extremely	Moderately	A little	Not at all
❍	❍	❍	❍

Page 10 - Question 7 - Choice - Multiple Answers (Bullets)

Degree type you have earned (check all that apply):

- ❑ AA
- ❑ BA
- ❑ BS
- ❑ BFA
- ❑ BARCH
- ❑ MA
- ❑ MS
- ❑ MFA
- ❑ MARCH
- ❑ PHD
- ❑ Other, please specify

Page 11 - Question 8 - Choice - Multiple Answers (Bullets) [M

How many years have you been in full-time practice after receiving your first professional degree?

- ❑ I am not a designer [Skip to 12]
- ❑ less than 1 year
- ❑ 1-5 years
- ❑ 6-10 years
- ❑ 11-15 years
- ❑ 16-20 years
- ❑ 21-25 years
- ❑ 26-30 years
- ❑ over 31 years

Page 12 - Question 9 - Choice - Multiple Answers (Bullets) [M

How many years have you been in full-time work, if not a design professional?

- ❑ I am a design professional [Skip to 13]
- ❑ less than 1 year
- ❑ 1-5 years
- ❑ 6-10 years
- ❑ 11-20 years
- ❑ 21-25 years
- ❑ 26-30 years
- ❑ over 31 years

Page 13 - Question 10 - Choice - Multiple Answers (Bullets)

Experience in market segment(s) (check all that apply):

- ❑ Healthcare
- ❑ Corporate/commercial
- ❑ Financial services
- ❑ Retail

- ❑ Hospitality
- ❑ Entertainment
- ❑ Residential
- ❑ Government
- ❑ Education
- ❑ Other, please specify

Page 14 - Question 11 - Choice - Multiple Answers (Bullets)

Current professional affiliation(s):

- ❑ AIA
- ❑ ASID
- ❑ IALD
- ❑ IIDA
- ❑ SCUP
- ❑ SMPS
- ❑ USGBC
- ❑ Other, please specify

Page 15 - Question 12 - Choice - Multiple Answers (Bullets)

Professional registrations/certifications:

- ❑ LC
- ❑ LEED AP
- ❑ NCARB
- ❑ NCIDQ
- ❑ RA
- ❑ RLA
- ❑ Other, please specify

Page 16 - Question 13 - Rating Scale - One Answer (Horizontal)

How satisfied are you with the work that you do in your firm?

Extremely	Moderately	A little	Not at all
❍	❍	❍	❍

Page 17 - Question 14 - Choice - Multiple Answers (Bullets)

Please check the range of your annual income:

- ❑ under $25,000
- ❑ $25,001-$45,000
- ❑ $45,001-$65,000
- ❑ $65,001-$85,000
- ❑ $85,001-$105,000
- ❑ over $105,000

Page 18 - Question 15 - Rating Scale - Matrix

My firm's value discipline: Mark your initial response to each statement; do not think about the statements too extensively.

	strongly agree	a g r e e	neither agree nor disagree	disagree	strongly disagree
This firm has a "go for it" attitude and an "out of the box" mindset.	❍	❍	❍	❍	❍
This firm is focused on lowest cost for services to achieve profit.	❍	❍	❍	❍	❍
Building client relationships requires the best solution to meet client needs.	❍	❍	❍	❍	❍
Providing a total solution is the most important objective in delivery of a project.	❍	❍	❍	❍	❍
This firm continually practices state-of-the-art procedures in architectural practice.	❍	❍	❍	❍	❍
While cost is an important consideration, project results and creativity matter most.	❍	❍	❍	❍	❍
Customer satisfaction is paramount in the way clients are managed.	❍	❍	❍	❍	❍
This firm provides reliable services at a competitive price.	❍	❍	❍	❍	❍
Improving customer value achieves superior profitability.	❍	❍	❍	❍	❍

Page 19 - Question 16 - Rating Scale - Matrix

Organizational Encouragement: the extent to which your firm values, rewards, and includes you in efforts related to creativity.

	strongly agree	a g r e e	neither agree nor disagree	disagree	strongly disagree
This firm encourages an active flow of ideas.	❍	❍	❍	❍	❍
People are recognized for their creative contributions to clients.	❍	❍	❍	❍	❍
People are allowed to fail if they did their best.	❍	❍	❍	❍	❍
There is recognition for creative work in this firm.	❍	❍	❍	❍	❍
Top management appreciates creative ideas.	❍	❍	❍	❍	❍

Page 20 - Question 17 - Rating Scale - Matrix

Intellectual Stimulation: the extent to which your firm encourages ideas, debate and discussion of ideas.

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
There is a great deal of idea exchange that goes on every day.	❍	❍	❍	❍	❍
There is an awareness of expectations regarding creative performance.	❍	❍	❍	❍	❍
The firm encourages continuous professional development through learning.	❍	❍	❍	❍	❍
Work assignments stimulate exchanges among staff.	❍	❍	❍	❍	❍
People engage in debate and discussion about "good" design.	❍	❍	❍	❍	❍

Page 21 - Question 18 - Rating Scale - Matrix

Leader support and feedback: the extent to which individuals in the firm receive information about work performance and whether there is feedback provided in the firm regarding work contributions and quality (Haynes, Wall, Bolden, Stride & Rick, 1999).

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
People usually know whether or not their work is satisfactory.	❍	❍	❍	❍	❍
Project managers/supervisors encourage staff to give their best effort.	❍	❍	❍	❍	❍
Project managers/supervisors set an example by working hard themselves.	❍	❍	❍	❍	❍
Project managers/supervisors offer constructive feedback to enhance the firm's innovation.	❍	❍	❍	❍	❍
Project managers/supervisors encourage people in the firm to develop new skills.	❍	❍	❍	❍	❍

Page 22 - Question 19 - Rating Scale - Matrix

Positive interpersonal exchange: the extent that there is a sense of togetherness and cohesion in the firm with little emotional conflict.

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
Team members back each other up at work.	❍	❍	❍	❍	❍
Members of the firm challenge each other's ideas in a constructive way.	❍	❍	❍	❍	❍
In a crisis situation, it's everyone for themselves.	❍	❍	❍	❍	❍
My team members would pitch in to help me with a difficult task.	❍	❍	❍	❍	❍
The people in my work group are committed to our work.	❍	❍	❍	❍	❍

Page 23 - Question 20 - Rating Scale - Matrix

Sufficient resources: appropriate resources (materials, funding, facilities, information, etc.) are available in the firm.

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
Facilities needed for projects are appropriate.	❍	❍	❍	❍	❍
Access to resources is not a problem in this firm.	❍	❍	❍	❍	❍
Budgets for project(s) are generally adequate.	❍	❍	❍	❍	❍
Information gathered in project research makes projects more creative.	❍	❍	❍	❍	❍
Access to project information is available to team members.	❍	❍	❍	❍	❍

Page 24 - Question 21 - Rating Scale - Matrix

Freedom: the extent to which you have autonomy in your choice of tasks and can choose how to conduct methods and procedures, work assignments, taking a break, how I do/plan the work and how I decide to carry out work as I think best (Haynes et al., 1999).

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
Employees determine the methods and procedures used to do their work.	❍	❍	❍	❍	❍
Employees decide when to take breaks from their work tasks.	❍	❍	❍	❍	❍
Management decides how the staff will accomplish work assignments.	❍	❍	❍	❍	❍
Staff have freedom to plan their own work.	❍	❍	❍	❍	❍
Management decides how best to carry out tasks to accomplish work.	❍	❍	❍	❍	❍

Page 25 - Question 22 - Rating Scale - Matrix

Challenging work: the extent to which work is meaningful and demanding in a positive way.

	strongly agree	a g r e e	neither agree nor disagree	d i s a g r e e	strongly disagree
This firm offers opportunities to work on challenging projects.	❍	❍	❍	❍	❍
Day to day assignments in this firm are challenging.	❍	❍	❍	❍	❍
Employees feel challenged by the projects currently in the firm.	❍	❍	❍	❍	❍
Work in this firm is important and meaningful.	❍	❍	❍	❍	❍
Work quality is important to members of the firm.	❍	❍	❍	❍	❍

Page 26 - Question 23 - Rating Scale - Matrix

Workload demands: the extent to which time pressures are perceived to be constricting and unreasonable expectations for performance are evident (Haynes et al., 1999).

	strongly agree	a g r e e	neither agree nor disagree	d i s a g r e e	strongly disagree
People in the firm do not have enough time to carry out their work.	❍	❍	❍	❍	❍
There are conflicting demands on people's time.	❍	❍	❍	❍	❍
Team members leave work feeling they have not completed everything to be done.	❍	❍	❍	❍	❍
Accomplishing basic tasks prevents people from completing more important ones.	❍	❍	❍	❍	❍
People in this firm have time to execute best practices when producing their work.	❍	❍	❍	❍	❍

Page 27 - Question 24 - Rating Scale - Matrix

Organizational roadblocks: receiving harsh and negative feedback on ideas, destructive competition, and the firm does not want to change or take risks.

	strongly agree	a g r e e	neither agree nor disagree	d i s a g r e e	strongly disagree
This firm emphasizes doing things the way they have always been done.	❍	❍	❍	❍	❍
There is destructive competition within this firm.	❍	❍	❍	❍	❍
Constructive feedback to everyone is a given in this firm.	❍	❍	❍	❍	❍
Top management does not take risks in this firm.	❍	❍	❍	❍	❍
People are too critical of new ideas in this firm.	❍	❍	❍	❍	❍

Page 28 - Question 25 - Rating Scale - Matrix

Creativity: extent to which creativity is an integral part of job functions, the functioning of units (department, studio, team), and the functioning of the firm as a whole.

	strongly agree	a g r e e	neither agree nor disagree	d i s a g r e e	strongly disagree
This firm produces innovative projects.	❍	❍	❍	❍	❍
Project tasks call for people to be creative.	❍	❍	❍	❍	❍
People are encouraged to be creative in the firm.	❍	❍	❍	❍	❍
People are encouraged to take risks in the firm.	❍	❍	❍	❍	❍
Overall, the current work of the firm is conducive to personal creativity.	❍	❍	❍	❍	❍

Page 29 - Question 26 - Rating Scale - Matrix

Productivity: extent to which the unit (department, studio, team) is efficient, effective, and productive.

	strongly agree	a g r e e	neither agree nor disagree	d i s a g r e e	strongly disagree
The procedures used by the firm are effective.	❍	❍	❍	❍	❍
Distractions from project work to meet client demands are daily occurrences.	❍	❍	❍	❍	❍
The firm operates with procedures and operational structures that are too formal.	❍	❍	❍	❍	❍
This firm is productive in getting projects completed on time.	❍	❍	❍	❍	❍
Overall, this form is efficient in the way work is accomplished.	❍	❍	❍	❍	❍

Page 30 - Question 27 - Rating Scale - Matrix

Job interdependence: extent to which group members must rely on or collaborate with others to complete their work (Dean & Snell, 1991).

	strongly agree	a g r e e	neither agree nor disagree	d i s a g r e e	strongly disagree
People on my team have to coordinate work with other people in the firm.	❍	❍	❍	❍	❍
Team members complete work that is started by others in the firm.	❍	❍	❍	❍	❍
Dealing with people outside the team is required to get the job done.	❍	❍	❍	❍	❍
Team members start work that is finished by other team members.	❍	❍	❍	❍	❍
Members of project teams primarily work by themselves.	❍	❍	❍	❍	❍

Page 31 - Question 28 - Rating Scale - Matrix

Workplace values: extent to which firm places importance on quality, innovation, cooperation, and wide participation in decision-making (Van Dyne, Graham & Dienesch, 1994).

	strongly agree	a g r e e	neither agree nor disagree	d i s a g r e e	strongly disagree
Individual employees are recognized and rewarded for superior performance.	❍	❍	❍	❍	❍
Reputation for quality surpasses major competitors.	❍	❍	❍	❍	❍
Innovative is of central importance.	❍	❍	❍	❍	❍
Individual employees are recognized and rewarded for innovative work.	❍	❍	❍	❍	❍
Reputation for innovation surpasses major competitors.	❍	❍	❍	❍	❍

Page 32 - Question 29 - Rating Scale - Matrix

Workplace values (cont'd.): extent to which firm places importance on quality, innovation, cooperation, and wide participation in decision-making (Van Dyne, Graham & Dienesch, 1994).

	strongly agree	a g r e e	neither agree nor disagree	d i s a g r e e	strongly disagree
Widespread participation in decision-making in the firm is highly valued.	❍	❍	❍	❍	❍
Employees are encouraged to express minority points of view.	❍	❍	❍	❍	❍
Procedures facilitate widespread participation in decision-making.	❍	❍	❍	❍	❍
Cooperation among employees is highly valued	❍	❍	❍	❍	❍
Reputation is as a very friendly place to work compared with other firms.	❍	❍	❍	❍	❍

Page 33 - Question 30 - Open Ended - Comments Box

Please share any comments you would like before exiting the survey that would help in understanding the creative work environment of this firm:

Within the parameters of this study, the relationship between creativity and values in architectural practice can be best described as the perception that individuals hold about creativity as a part of the job or firm or firm as manifested through actions to produce and

encourage creativity. Creativity can also be described as values manifested by the firm through recognition, perceived reputation, and collaborative decision-making.

Thank You Page

Thank you for your time and your support for creativity in architectural practice!

Screen Out Page

Thank you for your time.

Colorado State University

Appendix C. Recruitment Letter

[CSU LOGO/LETTERHEAD]

Date

Name/Title
Firm Name
Location

Dear _____;

I need your help in producing research that would be useful to you as a practitioner. I am undertaking research about architectural practice as part of my doctoral work in Organizational Performance and Change at Colorado State University. As a practitioner and as a professor of design with over 30 years in practice, I am interested in research that can be used in practice, specifically by firm principals to use creativity to leverage firm performance. My research study, *Organizational creativity: Investigating the relationship between the creative work environment and performance in architectural practice* examines two performance measures, choice of firm's value discipline and annual revenues as reported in *Architectural Record's* 2009 ranking of Top 250 firms. In addition, I am using measures for creativity that have been identified in research studies providing consistent and reliable information characterizing the creative work environment.

In this letter, I am inviting your firm and staff, both design and non-design, to take part in this research effort. Your firm represents one of 30 firms invited to participate, selected through a randomization process. The data will be collected through an electronic survey accessible through Zoomerang, a survey tool with which you may be familiar (www.zoomerang.com). Confidentiality will be strictly maintained for individual respondents and your firm name will not be identified. My focus is the organizational level and not specific firms, locations or individuals.

I would like to establish a time to talk with you about participating in the study when I can answer questions, share the survey instrument, and explain further the study objectives. I plan to collect data in November, over a three week period.

I anticipate that your support would include providing staff access to the Zoomerang site for a three week period, time for staff to complete the survey (20 minutes), a notice sent to your staff on your letterhead alerting them to the project and inviting their participation and sending two reminders to the staff to complete the survey. Text for notices and reminders to staff will be provided to you. I will also be able to provide you with access to the survey site for test purposes prior to the start of data collection. At the conclusion of the dissertation, I will provide a summary of findings to each firm participating in the study.

This research will add value to our profession. I hope you will see this as an opportunity to help in adding this value and that your staff will enjoy the opportunity to engage in the topic of creativity. I will plan to contact you in the next few days by phone to discuss the project further and answer any questions you may have at that time. Thank you for your time, attention, and support of creativity in architectural practice.

Sincerely,

Katharine E. Leigh, Associate AIA, IIDA, LEED AP BD+C
Doctoral Candidate and Professor of Design
Colorado State University
leigh@cahs.colostate.edu
970 491 5042

Appendix D. Notice to Firm Participants Text

[FIRM LOGO/LETTERHEAD]

To All Staff:
The firm has given permission to Katharine Leigh, Associate AIA, IIDA, LEED AP, a professor of design and doctoral candidate in organizational performance and change at Colorado State University to include our firm and staff in this study of creativity in architectural practice. The study entitled *ORGANIZATIONAL CREATIVITY: The relationship between the creative work environment and performance in architectural practice* is a component of her dissertation.

PLEASE support her effort and contributions to the architectural profession and your work; spend about 20 minutes completing the survey you can access at:
www.zoomerang/organizationalcreativity.com
It's important for everyone to complete the survey by _____!

THANK you!
Firm Principal

Appendix E. Follow-up Reminder Text

[FIRM LOGO/LETTERHEAD]

To All Staff:
You are reminded to participate in the study which is aimed at improving practice through increasing creativity in the workplace, and understanding the role of creativity in the firm's performance (measured by billings) and the value discipline held by all of you in the firm. Access to the study, ORGANIZATIONAL CREATIVITY, being conducted by a doctoral student from Colorado State University will end on _____;
We ask you to spend about 20 minutes completing the survey at:
www.zomerang/organizational creativity.com

Thank you! If you have already completed the survey – have a great day!

Appendix F. IRB Approval (2)

[1]

Research Integrity & Compliance Review Office
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011
Fort Collins, CO
TEL:#(970) 491-1553
FAX:#(970) 491-2293

NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE:	November 01, 2009
TO:	Vennesberg, Donald, Ph.D., Education Gilley, Jerry, Ph.D., Education, Leigh, Katharine, MS, Design & Merchandising, Anderson, Sharon, Ph.D., Education
FROM:	Barker, Janell, CSU IRB 2
PROTOCOL TITLE:	Organizational creativity: The relationship between the creative work environment and performance in architectural practice
FUNDING SOURCE:	NONE
PROTOCOL NUMBER:	09-1076H
APPROVAL PERIOD:	Approval Date: October 30, 2009 Expiration Date: October 22, 2010

The CSU Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled: Organizational creativity: The relationship between the creative work environment and performance in architectural practice. The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

If approval did not accompany a proposal when it was submitted to a sponsor, it is the PI's responsibility to provide the sponsor with the approval notice.

This approval is issued under Colorado State University's Federal Wide Assurance 00000647 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under CSU's Assurance, please do not hesitate to contact us.

Please direct any questions about the IRB's actions on this project to:

Janell Barker, Senior IRB Coordinator - (970) 491-1655 Janell.Barker@Research.Colostate.edu
Evelyn Swiss, IRB Coordinator - (970) 491-1381 Evelyn.Swiss@Research.Colostate.edu

Barker, Janell

Includes: Approval is for 5,000 participants total from 30 firms. Because of the nature of this research, it will not be necessary to obtain a signed consent form. However, all subjects must be consented with the approved electronic cover letter. The requirement of documentation of a consent form is waived under § _ _.117(c)(2).

[2]

Colorado State University
Knowledge to Go Places

Research Integrity & Compliance Review Office
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011
Fort Collins, CO
TEL: (970) 491-1553
FAX: (970) 491-2293

NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE:	November 08, 2010
TO:	Vanneberg, Donald, Education Swiss, Evelyn, RICRO, Leigh, Katharine, Design & Merchandising, Lehmann, Jean, 1588 School of Education
FROM:	Barker, Janell, CSU IRB 2
PROTOCOL TITLE:	Organizational creativity: The relationship between the creative work environment and performance in architectural practice
FUNDING SOURCE:	NONE
PROTOCOL NUMBER:	09-1076H
APPROVAL PERIOD:	Approval Date: November 04, 2010 Expiration Date: November 03, 2011

The CSU Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled: Organizational creativity: The relationship between the creative work environment and performance in architectural practice. The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

If approval did not accompany a proposal when it was submitted to a sponsor, it is the PI's responsibility to provide the sponsor with the approval notice.

This approval is issued under Colorado State University's Federal Wide Assurance 00000647 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under CSU's Assurance, please do not hesitate to contact us.

Please direct any questions about the IRB's actions on this project to:

Janell Barker, Senior IRB Coordinator - (970) 491-1655 Janell.Barker@Research.Colostate.edu
Evelyn Swiss, IRB Coordinator - (970) 491-1381 Evelyn.Swiss@Research.Colostate.edu

Barker, Janell

Appendix G. Permissions (3)

[1]
Sent: Mon 11/26/2007 4:44 AM

Dear Katharine,

Thanks for your enquiry.

Please feel free to deploy the measures if they meet your need. We have found that they work well both in the hospital environments for which they were designed, and (sutiably (sic)modified) elsewhere. They were, after all, based on measures designed for other settings.

I am not aware of any subsequent formal assessment or development of the scales, though an internet search might bring some to light.

There is, however, a new manual providing benchmark data for several outcome measures (job satisfaction, organizational commitment, mental health and work related stress),just published by Wiley (Stride C. B., Wall T. D. & Catley, N.), that may be of interest to you.

Good luck with your PhD.

Toby Wall

. Quoting "Leigh,Katharine" <kleigh@cahs.colostate.edu>:

> Dear Dr. Wall;
> I read your article with Claire Haynes and others (1999) in the
> British Journal of Health Psychology and wondered if I could ask you some questions.
> I am a professor of design at Colorado State University, interested in
> work environments and performance in creative organizations
> (architectural and design firms) and completing a Ph. D. in this area.
> I have also been looking at the work and KEYS scales of Theresa
> Amabile through the Center for Creative Leadership and wondered if you
> and your co-authors had looked at work?
>
> I would like to have your permission to use and adapt the scales
> developed in that paper if at all possible and I would like to know if
> you were satisfied with the measures, and if you have further
> developed and implemented these or similar measures?
>
> My research seeks to identify learning transfer, specifically far or
> creative transfer, in creative organizations and I think some of this
> information would be helpful.

>
> I look forward to hearing from you when you have a moment.
>
> Thank you,
> Katharine E. Leigh, IIDA, Associate AIA, LEED AP Professor and Program
> Coordinator

[2]

Order Confirmation

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leigh@cahs.colostate.edu
+1 (970)4915042
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[3]

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Appendix H. Comparison of Dimensions Across Studies Assessing the Climate for Creativity in Organizations

Amabile et al. (1996)	**Haynes et al., (1999)** [21]	**Ekvall &Ryhammar (1999)** [22]	**Ryhammar & Smith (1999)**	**Nemiro (2004)**	**Hunter et al., (2007)**[23]
10 dimensions	**9 dimensions**	**9 dimensions**	**6 dimensions**	**Varies**	**14 dimensions**
1.Organizational encouragement: the extent to which the organization values, rewards, and includes employees in efforts related to creativity.		**10. Debate:** encounters , exchanges , or clashes among ideas, viewpoints, and differing experiences and knowledge; many voices are heard and people are keen on putting forward their ideas.	**1.Organization-al structure.** **2.Climate.** **3.Culture.**	**1.Norms and protocols:** communications, assigning roles, accountability, protocols, and feedback.	**1.Mission clarity:** perception and awareness of goals and expectations regarding creative performance. **2.Positive interpersonal exchange:** sense of togetherness and cohesion in the organization; little emotional or affectively laden conflict in the organization. **3.Intellectual stimulation:** debate and discussion of ideas (not persons) is encouraged and supported in the organization (Ekvall, 1996). **4.Reward orientation:** creative performance is tied to rewards (Tesluk, Farr, & Klein, 1997). **5.Participation:** participation is encouraged and supported; communication between peers, supervisors and subordinates is clear, open and effective. **6.Organization-al integration:** integrated with external factors (outsourcing) as well as internal (cross0functional

[21] This study used similar factors but was used to measure work climate, not necessarily creativity and/or innovation.

[22] Definitions from the 10 dimensions included in the Creative Climate Questionnaire (Ekvall, 1996) are referenced (see Mathisen and Einarsen, 2004); only 9 are represented in this study.

[23] Meta-analysis

					teams.
2.Supervisory encouragement: the extent to which managers can effectively set goals, create an environment of open communications, and support their team members' ideas.	**1.Leader support:** working relationship with supervisor, encouragement of best effort, set an example themselves, offer new ideas for solving job-related problems, encourage to work as a team.	**1.Support for ideas:** ways new ideas are treated; in a supportive climate, mgrs and colleagues receive ideas and suggestions in an attentive and receptive way; possibilities fro trying out new ideas.	**4.Leadership style.**	**2.Leadership structure:** guide creative efforts of the team.	**7.Positive supervisor relations:** perception that employee's supervisor is supportive of new and innovative ideas; supervisor operates in a non-controlling manner (Oldham & Cummings, 1996). **8.Top management support:** creativity is supported and encouraged at the upper levels of the organization (Anderson & West, 1988).
3.Work group support: employee perceptions of the amount of diversity inherent in the team, the degree to which ideas and processes are challenged, the team's openness to novel ideas, and the amount of shared communication and collaboration inherent in the team.	**2.Peer support:** the extent to which other people provide help or support, and count on colleagues to listen to your problems, back you up, help with a difficult task or crisis situation.	**2.Challenge: the degree to** which the people in the organization are emotionally involved in its operations and goals and find pleasure and meaningfulness in their job.		**3.Connection:** dedication, establishing clear goals, sharing information, and personal bond. **4.Team member and management conditions and competencies:** acceptance of ideas, constructive tension, challenge, collaboration, freedom and manager, leader support, and time allocation.	**9.Positive peer group:** Perception of a supportive and intellectually stimulating peer group; relationships characterized by trust, openness, humor and good communication. **10.Challenge:** jobs and tasks are challenging, complex and interesting, not overly taxing or unduly overwhelming (Oldham & Cummings, 1996).
4.Sufficient resources: the extent to which employees perceive that all of the appropriate resources for being creative are available (i.e., funds, facilities, materials and information).			**5.Resources.**	**5.Communica-tion tools:** tech tools. Integration of information and face-to-face contact	**11.Resources:** perception that organization has, and is willing to use, resources to facilitate, encourage and implement creative ideas (Amabile, et al., 1996)
5.Freedom: the extent to which employees have autonomy in their tasks and can choose how to conduct their daily work.	**3.Autonomy and control:** amount of choice in the job to determine methods and procedures, work assignments, taking a break, how you do the	**3.Freedom:** independence of behavior exerted by members of the organization; in climates with a great deal of freedom, people are given autonomy to define much of their own work.			**12.Autonomy:** employees have autonomy and freedom in performing their jobs (Ekvall, 1996).

	work, how you plan the work and choice of carrying out he work as you think best. **4.Influence over decisions:** influence you have over decisions at work, what goes on in your work area, your opinion, contribute to meetings on new work developments and participate in decisions affecting you.	**4.Trust & openness:** degree of perceived emotional safety in relationships; when there is a strong level of trust, everyone dares to present ideas and opinions since initiatives can be taken without fear of reprisals or ridicules in case of failure.	
6.Challenging work: the extent to which employees perceive their work to be meaningful and challenging.	**5.Professional compromise:** problems in carrying out the work, trade-offs between care and cost savings, lack of agreement about responsibilities, unable to achieve quality due to staff shortages, and having to do acceptable minimum of work rather than best quality.		
7.Workload pressure: the extent to which employees perceive time pressures to be too constricting and feel that there are unreasonable expectations for performing their work.	**6.Work demands:** not enough time, conflicting demands, never finish work feeling that completed everything that should have been done, lack of adequate resources, can't do best practice in time available and basic tasks get in the way of more important ones.	**5.Time for ideas:** the amount of time one can use for developing new ideas; organizations characterized with much idea time are giving possibilities to discuss and test impulses and suggestions that are not planned or included in the task assignment.	**6.Workload pressure.**
8.Organizational impediments: the extent to which employees perceive any of the following:	**7.Feedback:** information received about work performance	**6.Conflict & impediments:** the degree of emotional and personal tensions in	

receiving harsh negative feedback on ideas, destructive competition, or the organization does not want to change or take risks.	including whether the work is satisfactory, how performing on the job, and whether doing the job well or poorly. **8.Role conflict:** conflicting instructions, demands and accepted by one person but not by another.	the organization; in climates with high levels of conflict, groups and individuals dislike each other and there is considerable gossip and slander.		
9.Creativity: the extent to which employees feel that being creative is an integral part of their job, the functioning of their department, and the functioning of their organization as a whole.		**7.Risk-taking:** tolerance of uncertainty in the organization; in high risk-taking climate, decisions and actions are rapid, arising opportunities are seized upon, and concrete experimentation is preferred to detailed investigation and analysis. **8.Playfulness & humor:** perceived ease and spontaneity, a relaxed atmosphere with laughter and jokes. **9.Dynamics & liveliness:** in a dynamic climate, new things happen all the time and there are frequent changes in the ways of thinking about and handling issues.	**6.Creative process and work design approach:** process leading to promising creative results, and guiding creative efforts of team. **7.Creativity techniques and software tools:** specific techniques, usefulness, and adequacy..	**13.Flexibility and risk-taking:** organization is willing to take risks and deal with uncertainty and ambiguity associated with creative endeavors (Ayers, Dahlstrom, & Skinner, 1997). **14.Product emphasis:** organization is committed to quality as well as originality of ideas.
10.Productivity: the extent to which employees perceive their department, unit or organization to be efficient, effective, and /or productive.	**9.Role clarity:** clear planned goals and objectives, divided time properly, know responsibilities, clear explanations and expectations.			

Appendix I. Comparison of Research Design and Methods in Studies of Creativity in the Work Environment

Author	Research design	Variables of interest	Statistics
Rosenberg, 2007	Instrumentation analysis for equivalence: KEYS scales	Organizational encouragement, supervisory engagement, work group supports, sufficient resources, freedom, challenging work, workload pressures, organizational impediments, creativity, productivity	CFA Item response theory Item parameter estimation Person parameter estimation Equating Determination of DIF
Hunter et al., 2007	Meta-analysis of creativity climate factors	Positive peer group, positive supervisor relations, resources, challenge, mission clarity, autonomy, positive interpersonal exchange, intellectual stimulation, top management support, reward orientation, flexibility and risk-taking, product emphasis, participation, organizational integration	Content analysis w/experts Effect size
Ensor et al., 2006	Survey questionnaire	KEYS scales	Frequencies t-test for one sample vs population means and sample means vs KEYS population means
Baer & Oldham, 2006	Survey questionnaire	Experienced creative time pressure, openness to creativity, support for creativity, creativity,	Intraclass correlation coefficient Controlled for education and job complexity Hierarchical regression
Edmonds et al., 2006	Interactive art	Creative engagement, attractors, sustainers, relaters	Visual analysis
Carson et al., 2005	Instrumentation analysis: CAQ	Domains of creative achievement	Expert rater Correlations Principal component analysis with varimax rotation
Egan, 2005	Key informant process w/ interview guide	Team diversity and creativity	Content analysis
Mathisen & Einarsen, 2004	Instrumentation analysis: CAQ	KEYS, SOQ, TCI, SSI and CCQ	-
Politis, 2004	Survey questionnaire	KEYS scales	Correlation analysis
Vincent et al., 2002		Expertise and problem solving	Expert rater SEM
Axtell et al., 2000	Survey	Innovative variables	Moderated regressions
Shalley et al., 2000	Structured telephone interviews	Creativity requirement, work environment, psychosocial outcomes	OLS regression
Strazalecki, 2000	Model development	Design attributes	?possible regression or correlation
Haynes et al., 1999	Survey questionnaire	Work characteristics	CFA

Ekvall & Ryhammar, 1999		Creative organizational and individual resources	Correlations Partial correlations Regression analysis
Ryhammar & Smith, 1999	Questionnaires	Creative personality	CFT
Mohamed & Rickards, 1996	Survey questionnaire - CCQ	Creative Climate factors	Descriptive Unknown
Ekvall, 1996	Instrumentation analysis: CCQ	Resources, climate and effects on factors	Comparison of means Correlations
Anderson & West	Instrumentation analysis: TCI	teambuilding	EFA CFA
Amabile et al., 1996	KEYS scales	Creative climate factors	MANOVA

Appendix J.1-10. Creative Work Environment Factor Correlations and Reliabilities

Table J.1
Organizational Encouragement (N = 82)

Variable	This firm encourages an active flow of ideas	People are recognized for their creative contributions to clients	Failure is an acceptable outcome, if the effort was appropriate	People are rewarded for creative work in this firm	Top management appreciates creative ideas	*M*	*SD*
1	--	.64**	.37**	.45**	.50**	2.13	.87
2		--	.15	.65**	.54**	2.47	.94
3			--	.40**	.13	3.07	1.04
4				--	.67**	2.69	.91
5					--	2.24	.85

***p* = .001
Cronbach's alpha = .79

Table J.2
Intellectual Stimulation (N = 81)

Variable	There is a great deal of idea exchange that goes on every day	There is an awareness of expectations regarding creative performance	The firm encourages continuous professional development through learning	Work assignments stimulate exchanges among staff	People engage in debate and discussion about "good" design	*M*	*SD*
1	--	.75**	.52**	.42**	.61**	2.62	.98
2		--	.38**	.45**	.54**	2.55	.88
3			--	.44**	.36**	2.18	.99
4				--	.50**	2.26	.80
5					--	2.22	.93

***p* = .001
Cronbach's alpha = .83

Table J.3
Leader Support and Feedback (N = 81)

Variable	People usually know whether or not their work is satisfactory	Project managers/ supervisors encourage staff to give their best effort	Project managers/ supervisors set an example by working hard themselves	Project managers/ supervisors offer constructive feedback to enhance the firm's innovation	Project managers/ supervisors encourage people in the firm to develop new skills	*M*	*SD*
1	--	.58**	.34**	.51**	.34**	2.41	.80
2		--	.48	.53**	.37**	2.04	..70
3			--	.55**	.35**	2.05	.85
4				--	.62**	2.50	.82
5					--	2.30	.92

***p* = .001
Cronbach's alpha = .81

Table J.4
Positive Interpersonal Exchange (N = 81)

Variable	Team members back each other up at work	Members of the firm challenge each other's ideas in a constructive way	In a crisis situation, it's everyone for themselves	My team members would pitch in to help me with a difficult task	The people in my work group are committed to our work	*M*	*SD*
1	--	.58**	-.47**	.55**	.34**	2.13	.83
2		--	-.41**	.31**	.19	2.39	.82
3			--	-.55**	-.50**	3.46	.92
4				--	.64**	1.80	.66
5					--	1.75	.62

***p* = .001
Cronbach's alpha = .09

Table J.5
Sufficient Resources (N = 78)

Variable	Facilities needed for projects are appropriate	Access to resources is not a problem in this firm	Budgets for project(s) are generally adequate	Information gathered in project research makes projects more creative	Access to project information is available to team members	*M*	*SD*
1	--	.66**	.15	.19	.26*	2.18	.71
2		--	.33**	.14	.148	2.45	.92
3			--	.26*	.15	2.79	.81
4				--	.47**	2.27	.86
5					--	1.99	.71

***p* = .001 ; **p* = .01
Cronbach's alpha = .65

Table J.6
Freedom (N = 81)

Variable	Employees determine the methods and procedures used to do their work	Employees decide when to take breaks from their work tasks	Management decides how the staff will accomplish work assignments	Staff have freedom to plan their own work	Management decides how best to carry out tasks to accomplish work	*M*	*SD*
1	--	.51**	-.22*	.40**	-.11	2.37	.78
2		--	-.22*	.51**	-.12	1.96	.81
3			--	-.45**	.54**	2.80	.86
4				--	-.42**	2.18	.74
5					--	2.85	.82

***p* = .001 ; **p* = .01
Cronbach's alpha = .16

Table J.7
Challenging Work (N = 80)

Variable	This firm offers opportunities to work on challenging projects	Day to day assignments in this firm are challenging	Employees feel challenged by the projects currently in the firm	Work in this firm is important and meaningful	Work quality is important to members of the firm	*M*	*SD*
1	--	.55**	.56*	.59**	.32**	1.83	.70
2		--	.50*	.46**	.12	2.24	.78
3			--	.50*	.36**	2.25	.68
4				--	.49**	1.88	.74
5					--	1.68	.67

***p* = .001 ; **p* = .01
Cronbach's alpha = .80

Table J.8
Workload Demands (N = 78)

Variable	People in the firm do not have enough time to carry out their work	There are conflicting demands on people's time	Team members leave work feeling they have not completed everything to be done	Accomplishing basic tasks prevents people from completing more important ones	People in this firm have time to execute best practices when producing their work	*M*	*SD*
1	--	.60**	.50**	.40**	-.40**	2.47	.88
2		--	.67**	.50**	-.39**	1.99	.78
3			--	.60**	-.54**	2.42	.83
4				--	-.38**	2.75	.85
5					--	2.77	.82

***p* = .001
Cronbach's alpha = .48

Table J.9
Organizational Roadblocks (N = 79)

Variable	This firm emphasizes doing things the way they have always been done	There is destructive competition within this firm	Constructive feedback to everyone is given in this firm	Top management does not take risks in this firm	People are too critical of new ideas in this firm	*M*	*SD*
1	--	.29**	-.20	.43**	.47**	2.97	.98
2		--	-.47**	.26*	.51**	3.61	1.03
3			--	-.14	-.37**	2.81	.86
4				--	.59**	3.42	.90
5					--	3.32	1.04

***p* = .001 ; **p* = .01
Cronbach's alpha = .48

Table J.10
Productivity (N = 77)

Variable	The procedures used by the firm are effective	Distractions from project work to meet client demands are daily occurrences	The firm operates with procedures and operational structures that are too formal	This firm is productive in getting projects completed on time	Overall, this firm is efficient in the way work is accomplished	*M*	*SD*
1	--	.29**	-.20	.43**	.47**	2.97	.99
2		--	-.47**	.26*	.51**	3.60	1.03
3			--	-.14	-.37**	2.81	.86
4				--	.60**	3.41	.90
5					--	3.32	1.04

***p* = .001 ; **p* = .01
Cronbach's alpha = .23

Appendix K. Coding Guidelines

- All quantitative data are numerically coded.
- All values are mutually exclusive.
- Missing data from non-response was filtered in the analyses and identified as a user-missing value; coded as 999.
- Likert scale responses were coded with low numbers as agreement, high numbers as disagreement.
- Highest position was used in cases where individuals checked several roles.
- Firm identity was determined by sequence of responses; missing firm was coded from responses of cases on either side of the case with missing firm.
- Education was coded using highest degree recorded.