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An Investigation into Perceived Productivity and Its Influence on the Relationship Between Organizational Climate and Affective Commitment

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AN INVESTIGATION INTO PERCEIVED PRODUCTIVITY AND ITS INFLUENCE ON THE RELATIONSHIP BETWEEN ORGANIZATIONAL CLIMATE AND AFFECTIVE COMMITMENT

by

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ABSTRACT

AN INVESTIGATION OF PERCEIVED PRODUCTIVITY
AND ITS INFLUENCE ON THE RELATIONSHIP BETWEEN
ORGANIZATIONAL CLIMATE AND AFFECTIVE COMMITMENT

Kaitlynn M. Castelle
Old Dominion University, 2016
Director: Dr. Charles B. Daniels

The purpose of this research is to investigate the influence of individually perceived productivity on the relationship between individually assessed organizational climate and affective commitment, from heterogeneous survey participant data. A theoretical framework is adopted to explain how organizational climate shapes employee perception and how this relationship is moderated by a perceived productivity. This is a relatively unexplored concept in the defined context and has been developed by the researcher. Perceived productivity was measured using an instrument developed in this research to gauge respondents' perception of their productivity. The instrument, named the General Measure of Perceived Productivity (GMPP), was developed in a mixed-methods approach that employed both qualitative and quantitative tools. Exploratory factor analysis (EFA) of the instrument was performed to establish validity and reliability, using pilot survey data. The main study applied the GMPP along with other research variable instruments to measure organizational climate and affective commitment, also at the individual unit of analysis. Moderated multiple regression analysis was used in the proposed model, in which perceived productivity moderates the relationship between organizational climate (the independent variable) and affective commitment (the dependent variable). The results demonstrate that the relationship

between organizational climate and affective commitment depends on the level of perceived productivity, and is strengthened in the presence of higher perceived productivity. This research supports the existing body of literature relating to organizational behavior while developing a theory on a new concept, perceived productivity.

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This dissertation is dedicated to the proposition that

the harder you work, the luckier you get.

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"The trouble is we think we have time." – Jack Kornfield

LIST OF ACRONYMS AND ABBREVIATIONS

ANOVA = Analysis of Variance

CFA = Common Factor Analysis

CVF = Competing Values Framework

EFA = Exploratory Factor Analysis

GJS = Global Job Satisfaction

GMPP = General Measure of Perceived Productivity

OCM = Organizational Climate Measure

OLS = Ordinary Least Squares

MMR = Moderated Multiple Regression

PCA = Principle Component Analysis

SD = Standard Deviation

VIF = Variance Inflation Factor

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CHAPTER 1

INTRODUCTION

Various studies have shown that organizational climate has been shown to influence job satisfaction and commitment and has an impact on both individual and organizational productivity and performance (Furnham & Goodstein, 1997; Patterson et al., 2004; Randhawa & Kaur, 2014). Individual productivity is important because it contributes to group productivity, which in turn contributes to organizational productivity (Ruch, 1994, p. 106). While objective performance is important, human beings often operate on perceptions rather than reality: Endler and Magnusson (1976) found that "the meaning an individual assigns to a situation appears to be the most influential situational factor affecting his or her behavior" (p. 967). It is unclear what relationships an individual's perceived productivity may have on his or her job satisfaction or affective commitment. Objective productivity in manufacturing, measured by performance reports, has shown to be linked to organizational climate (Patterson, Warr, & West, 2004), although the subjective beliefs regarding productivity have not been investigated in the literature, in this context.

This research study investigates the relationship between organizational climate and job attitudes reported by employees from engineering firms. A theoretical framework is adopted to explain the organizational factors that shape job attitudes and how these factors might be moderated by a perceived productivity, a relatively unexplored concept to be developed by the researcher. The research presumes that perceived productivity could be operationalized to measure the variable.

The findings of this research are beneficial in helping organizations to understand the dynamics of their organizational climates. The research supports the existing body of literature related to organizational climate by contributing a new cross-sectional study while developing theory in a new area of exploration: perceived productivity.

For decades, research about organizational climate and culture has struggled to remain a relevant field of study and has turned new researchers away, due to its disorganization and overall disagreement and inconsistency in the literature. Unfortunately, most of the growth in the field has been in developing numerous constructs to articulate and instruments to measure, instead of refining and building off of what already exists. Many are promising, however, and need to be deployed in different contexts and in different cross-sectional studies, in order to strengthen existing theory.

RESEARCH OVERVIEW

This research seeks first to develop an instrument to provide a general measure of perceived productivity. The research methodology implements both qualitative and quantitative techniques to develop and validate the scale. Among the wide range of techniques employed are qualitative content analysis, reviewer feedback via interviews, exploratory factor analysis, and confirmatory factor analysis. The results of the first phrase are then implemented into a larger main study in which the newly developed instrument operationalizes perceived productivity and introduces it into a study as a moderator variable. The main study employed validated instruments to test the relationship between organizational climate and affective commitment, that is potentially

moderated by perceived productivity, developed as a new construct, and measured by the research-developed instrument.

PROBLEM DEFINITION

The correlation between organizational climate and outcomes such as absenteeism, job satisfaction, and commitment has long been established (e.g. Schneider & Snyder, 1975; Churchill, Ford, & Walker, 1976; Pratap & Srivasta, 1985; Patterson et al., 2004, 2005; Dorgham, 2012; Randhawa & Kaur, 2014; Bahrami et al., 2016; Lau et al., 2017). Some of these studies have attempted to find links to actual job performance and productivity, although none have investigated perceived productivity in the given context. It has not yet been determined how organizational climate and job attitudes are related to this concept. It is hypothesized that perceived productivity can be measured and can be shown to be a moderating variable between the way organizational climate is perceived by an individual and his or her reported affective commitment.

While "perceived productivity" is not a new term used in literature, it is at the formative stage of research (Haynes, 2009) and is limited in the context explored. The literature also lacks a general measure of perceived productivity. In developing organizational effectiveness constructs, more theory is needed to determine the relevant features of climate constructs and how profile configurations should look. With insight about perceived productivity, the potential exists for improvement in facets of organizational climate as well as psychological climate through the discovery of what factors are related to perceived productivity.

OPERATIONAL DEFINITIONS

"Every concept must have an operational definition which has validity in the sense that it measures those properties and only those properties specified in the conceptual definition...[they] are essential for empirical testing of any hypothesis" (French and Kahn, 1962, p. 5). Martin (2002) asserts that it is possible for organizational researchers to promote and value dissident research so long as each study defines the concepts and paradigms used, so that we may "make ourselves understood, build on each other's work, and begin to explain to the rest of the field why what we are doing is important" (p. 53).

The operational definitions are introduced in this section, in order to provide the reader with the researcher's interpretation of the word as it is applied to this research. In the literature review, these terms will be discussed in greater detail, with reference to their origins. In the analysis, it is the relationships among the variables as defined that will be explored. The summary of definitions are provided in Table 1:

Table 1: Operational Definitions.

Concept	Description
Psychological climate	How organizational environments are perceived and interpreted by their employees, measured in terms of perceptions that are psychologically meaningful to the individual rather than in terms of concrete organizational features
Organizational climate	The perceptions of organizational policies, practices, and procedures, of members working in a unit (both formal and informal), which may be measured on any number of dimensions related to the topic of study, and may be measured on an individual, group, or organizational level of analysis
Productivity	The ratio of output to input in an organizational process. This may be a measure of effectiveness (producing the right products or services), efficiency (prudent utilization of resources), and quality (meeting technical and customer specifications)
Perceived productivity	The attitudinal state of an individual derived from the perception that an environment conducive to the effective or efficient use of organizational resources and processes is present
Affective commitment	The extent of an employee's positive emotional attachment to, identification with, and involvement in the organization

Because the definitions "psychological climate" and "organizational climate" have been used with dissonance in the literature, with some arguing that the two are separate constructs and others suggesting that organizational climate is an aggregated measure of psychological climate (e.g. James & Jones, 1974; Glick, 1985; Castro & Martins, 2010; Ehrhart, Schneider, & Macey, 2013), the term "organizational climate" is measured on the individual unit of analysis, but are not referred to as "psychological climate" in the context of this research. Further discussion is provided in the literature review.

RESEARCH PURPOSE AND OBJECTIVES

The overarching aim of this research is to explore perceived productivity as an operationalized variable that may moderate the relationship between organizational climate and job attitudes. Following the development of the construct and instrument for the general measure of perceived productivity, correlations between the variables are explored to test the possibility that perceived productivity moderates the relationship between the independent and dependent variables. The following questions guide the research inquiry:

1. What instrument can be developed to operationalize perceived productivity, in order to obtain a general measure?
2. Does perceived productivity moderate the relationship between organizational climate and affective commitment? If not, to what extent do relationships exist between these variables?

The study proceeded in three stages. In the first stage, perceived productivity was explored to identify themes of perceived productivity and to define the characteristics of productivity that may be perceived by an individual in an organization. Stage one concluded with the development of an instrument by use of qualitative data, permitting operationalization of perceived productivity. In the second stage, the instrument was further developed through quantitative methods following results of the pilot study. In the third stage, perceived productivity was explored as a moderating variable to assess possible linkages to the predictor variable (organizational climate) and the outcome variable (affective commitment).

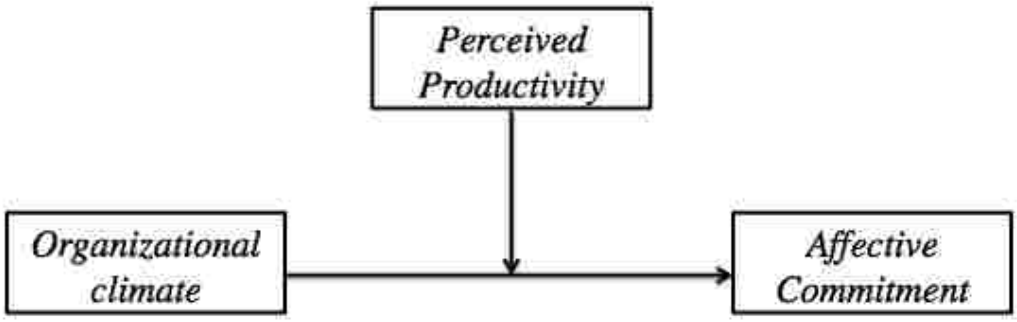
This research investigated the influence of organizational climate on perceived productivity and affective commitment. Organizational climate has not previously been explored in research on perceived productivity. While both perceived (subjective) and actual (objective) productivity are important, this research focused on the former, for several reasons: (1) organizational climate and objective productivity have already been linked (e.g. Patterson et al., 2004), although organizational climate and subjective productivity have not; (2) purportedly objective measures of productivity do not capture beliefs about productivity, which are of interest in relation to affective commitment, which is also focused on belief about one's place and value in the organization; (3) when dealing with the heterogeneous sample, metrics for measuring objective productivity vary from organization to organization, as well as from department to department; (4) subjective productivity has been given significantly less attention in the literature, instead focusing on objective productivity, and (5) in many instances, actual productivity is

difficult to measure, for example, in software development when project milestones are less tangible (Abdel-Hamid, 1989).

THEORETICAL FRAMEWORK

Figure 1 shows a general overview of the theoretical framework that guides the research. The diagram depicts perceived productivity as a possible moderating variable between organizational climate and affective commitment.

Figure 1: Researcher's Theoretical Framework



KEY ASSUMPTIONS

This research is based on the critical assumption that organizational climate properties can be perceived with reasonable accuracy by members of an organization, and can be captured, as well, on a questionnaire. The criteria for determining the level of appropriateness of the questionnaire are discussed in Chapter 3. These assumptions are

well supported in organizational climate literature (Litwin & Stringer, 1968; Tagiuri & Litwin, 1968; Vilcox & Mohan, 2007; Forte, 2011).

A meta-analysis of the literature reveals the following assumptions that provide a basis for the investigation:

- A relationship between an individual engineer's perceptions of his/her organization's culture manifested and articulated through the construct organizational climate and affective commitment.
- Organizational climate perceived by the individual, otherwise known as psychological climate, can be quantitatively measured through the use of an appropriate survey instrument.
- Affective commitment can be quantitatively measured through the use of appropriate survey instruments.
- An empirically valid and reliable instrument can be constructed for the general measure of perceived productivity.
- Mental models do not differ significantly, in that survey items, which have demonstrated face validity, will generally be perceived in the same context for the individual participants.

OVERVIEW OF RESEARCH APPROACH

A literature review was conducted. Instruments were chosen for each variable based on availability, reliability, validity, applicability, and length. An instrument was developed for the general measure of perceived productivity, to be first deployed to a pilot sample to establish reliability and validity. Next, a survey containing all three

instruments (46 items) was deployed to research participants in a main survey. Scale reduction allows regression analysis of organizational climate, perceived productivity, and affective commitment in the moderation analysis model.

SCOPE AND DEPTH OF RESEARCH

The scope of the research is quite broad; this is a result of the limited amount of organizational literature that addresses perceived productivity. It was uncertain how climate would be relevant to the individually perceived productivity levels, so a broad interpretation of climate was employed.

SIGNIFICANCE OF STUDY

This study introduces a relatively new concept, perceived productivity, which has previously been explored primarily in the physical and behavioral dimensions. Haynes (2007) showed that behavioral components have a greater effect on productivity than physical components. According to Haynes (2009), "office productivity is at a formative stage of research, and is an area worthy of research activity" (p. 170). Academic literature on perceived productivity is limited and has only been explored in physical and social aspects (e.g. lighting, temperature control, interruptions, private areas, meeting spaces) (Haynes, 2009). If employers could change their organizational climates to increase the perceived productivity of their employees, there is a possibility that associated benefits might also be realized.

As retirement rates among the "Baby Boomer" generation rise, recruitment and retention issues become of greater importance, meaning that investigations of the ways in

which workers perceive their workplace and which variables are related are highly relevant (Kjeldsen and Andersen, 2012). Attracting and developing talent continues to be a major challenge for the STEM industry (Duderstadt, 2008).

Because human beings operate on perceptions versus reality (Endler and Magnusson, 1976), subjective measures (perceptions of productivity) are equally important, if not more so, than objective measures. It is unclear if or how perceived productivity has an effect on the morale of an organization's employees, but it is clear that affective commitment is a plausible indicator of morale (Langkamer & Ervin, 2008; Nolan et al., 1998).

EXPECTED RESEARCH CONTRIBUTIONS

This section suggests some expected contributions that will manifest as a result of the research effort. There will likely be many other findings that emerge in the future as a result of this research, both supporting various existing theories in academic literature and contributing to the engineering management discipline and to the body of knowledge that informs practitioners and consultants.

The research has two major goals. The first is to develop the concept of perceived productivity, which is in the formative stage of research (Haynes, 2009) and to propose an instrument that could permit operationalization of the variable. The second is to contribute to the existing body of literature relating to organizational climate and affective commitment while developing theory on a new concept, perceived productivity, which may moderate the relationship.

From the research, a first-generation instrument for the general measure of perceived productivity is a major contribution, which can evolve through future research and practice, permitting the testing of new hypotheses related to perceived productivity. If the variance in perceived productivity can help explain the relationships between organizational climate and affective commitment, this could also support stronger articulation and distinction as to what perceived productivity is and why it matters.

Contributions to discipline. It is expected that this work will help engineering managers increase understanding about how perceptions about work matter in order to create environmental conditions where employees are more likely to thrive. It is presented at a critical time in society, since many in the workforce are preparing to retire, even as the need for engineers has increased (Duderstadt, 2008). Organizational climate is a major facet of understanding organizational culture and context. The knowledge gained from this study will help engineering managers understand how their followers are influenced by their organizational climate. This is valuable knowledge, as the climate is capable of emergent change, and "bottom up" initiatives are often more effective than "top down" initiatives (Bamford & Forrester, 2003), enabling leaders to, in turn, develop their followers in ways to improve the organizational structure and processes.

It is rare that new variables of interest are introduced in any field, and perhaps equally rare that research methodologies are introduced or evolve within a field. The proposed research promotes the use of mixed methods designs in academic research in a field that is dominated by quantitative methods. Creswell and Plano Clark (2007) reviewed hundreds of mixed methods research designs and typologies and identified the most common combinations, although they acknowledged that there are potentially

unlimited unique combinations of research designs. Checkland (2000) argued that methodology in a situation leads to a method, and, given a complex problem, it is up to the methodology user to be competent in relating the approach adopted to the general research framework.

The overarching theme of this research is an exploration of the proposed theory of perceived productivity – in particular, what it is, how it can be measured, and how it influences relationships with other individually perceived variables. This research promotes awareness and the future use of mixed methods approaches in the field of engineering management, industrial-organizational psychology, and behavioral research, in a field that is heavily dominated by quantitative approaches.

Contributions to theory. The research contributions expected as a result of this study apply to theory in several domains. The contribution intended to emerge from this dissertation is valid, empirical evidence that will add to the body of knowledge and will advance the research of others in the engineering management behavioral research and industrial-organizational psychology arenas, regardless of any theoretical differences in opinion on perspective, approach, and methods used to address the research questions.

While academic literature on productivity, as it pertains to individuals and organizations, currently exists, the literature is lacking with respect to exploring the manner and the extent to which individuals *perceive* productivity. According to Linna et al. (2010), "Networking and collaboration in its [perceived productivity] advancement and in creating a common understanding are needed" (p. 489). It has been suggested that when productivity is understood more widely, certain benefits could be achieved, such as identified improvements in processes, products, and services (Linna et al., 2010).

The research on perceived productivity is in the formative stage (Haynes, 2009) and is limited in the aspects that it has explored. Literature also lacks an instrument for the general measure of perceived productivity. Schriesheim et al. (1993) argued, "The sound measurement of constructs is needed if any scientific discipline is to advance" (p. 386). Ahire and Devaraj (2001) advocated the use of measurement instruments to examine causal relationships among constructs constituting theoretical frameworks as a critical strategy for advancing engineering management research.

The research supports the existing body of literature related to organizational climate and job attitudes by contributing a new cross-sectional study, while developing theory in a new area of exploration: perceived productivity. Organizational climate research enriches our understanding of organizational theory (McMurray, 1994). Special attention is needed when comparing productivity in different organizations (Linna, Pekkola, Ukko, & Melkas, 2010). In developing organizational effectiveness constructs, more theory is needed to determine the relevant features of climate constructs and how profile configurations should look. The findings of this research will be beneficial in helping organizations understand the dynamics of their climates and how individual job attitudes may be impacted by perceptions of productivity within their organization. The researcher expects that this work will help engineering managers increase understanding about how perceptions about work matter to create environmental conditions where employees are more likely to thrive.

Contributions to practice. Due to the increasingly popular belief that many aspects of organizational cultures do not align with contemporary values, there is a need for the managers of an organization to be able to determine which aspects of an

organization's culture should be preserved and which should be modified (Chamba, 2015). Although organizational culture is slow to change, organizational climate, a direct manifestation of culture (Schein, 1990), is quick to change (Cameron, 2004). The architecture of change offers great potential through new policies, behaviors, patterns, methodologies, products, and market ideas (Kanter, 1992).

When equipped with a positive, holistic understanding of one's organizational culture, individuals become more willing to commit themselves to their organization (Sun, 2008). By studying the effects of organizational climate, adjustments can be made by engineering managers to scaffold possible negative impacts on their direct reports (engineers). As research by Bandura (1996) has shown, higher mental processes contribute to learning through observation and indirect experience, suggesting that organizational climate highly influences followers. The way in which followers are impacted by their perceived organizational climate is critical knowledge, which may inform managers of how to mitigate the existing circumstances to lead and develop their followers accordingly.

EXPECTED RESEARCH LIMITATIONS

The following research limitations have been identified:

1. The focus is *not* a cross-level analysis. All variables are established from case data collected on an individual level.
2. Although information may be collected, the focus of the analysis is not individual demographics, company metrics, etc.

3. Climate will be measured within a general measure of organizational climate, in that the focus is not on any intercorrelations between the defined dimensions, nor are sets of dimensions investigated together as a system. Given the large set of dimensions possible for exploration, a single-dimensional organizational climate construct is adopted.

ORGANIZATION OF DOCUMENT

Chapter 1 contained the introduction and background related to the course of study, the supporting reasons for inquiry, and the contextual background. In Chapter 2, the literature review is covered. Chapter 3 outlines the research methodology. Chapter 4 presents the data and results of the executed research methodology. Chapter 5 discusses the results, implications, and limitations, and concludes the dissertation. The references and appendices follow.

CHAPTER 2

LITERATURE REVIEW

The dissertation research begins with a literature review of psychological climate and organizational climate theory, constructs, models, research methods, and instruments, and the cited differences in climate and culture that exist universally in various countries and industries. While the existing literature is limited in the context of perceived productivity, a search for available research, as well as some background into the broad subject of objective productivity, was conducted. The literature review also addressed job attitudes, with a focus on affective commitment and its relevance to the research study. This section reports the results of this literature review. Despite the worldview of the researcher, a considerable effort was made to read and learn enough to make use of, and cite, studies that were conducted with differing approaches, especially with respect to their own research paradigm.

The way in which authors conceptualize an organizational climate guides their research and subject matter of inquiry. Throughout the chapter, the operational definitions are discussed, as well as the history, context, and nature of organizational climate research, the assumed theoretical basis of culture, and the means of measurement. Strengths and weaknesses of organizational climate research are explored. The terms "organizational culture" and "organizational climate" are also distinguished, in terms of operational definitions.

HISTORICAL CONTEXT OF CLIMATE RESEARCH

Climate research led by Lewin, Lippi, and White began as early as the 1930s, with an interest in the relationship between leaders and followers. It was observed that even when leader behavior is modified among groups, differences existed that were believed to be the result of a "social climate" (Schneider et al., 2011). Argyris (1957) and McGregor (1960) conducted research on "managerial climate" as interest on fairness and justice in the workplace became of interest. The actual term "organizational climate" and the idea of a climate construct were not introduced until the 1960s. Early research in this field inferred the existence of climate but did not attempt to measure it.

Forehand (1964) identified three characteristics of climate: its uniqueness among organizations, its enduring nature, and its ability to affect the behavior of individual members (Landy & Conte, 2004).

Litwin and Stringer (1968) developed one of the first climate instruments, operationally defining organizational climate as "the sum of perceptions of individuals working in the organization" (p. 66). Their paper concluded that an appropriate questionnaire could be used to survey members of an organization about their perceptions of their workplace environment. When designing climate measures, survey items must be carefully written to address what the respondent believes actually happens in his/her organizational setting, rather than how the respondent feels about it (Schneider, 1981).

Early measures of organizational climate developed inconsistently among research studies, as they focused on four different facets of climate: leadership behaviors, job attributes, social-interpersonal relationships, and reward system characteristics (Schneider et al., 2011). The nature of the climate being assessed was often left

unspecified, as there was greater interest to define hypothetical causes of climate, rather than to develop psychometric climate instruments (Schneider, 2011). Another issue plaguing climate research is the ongoing issue of inference problems regarding unit of theory and analysis, which has stagnated climate research (Glick, 1985).

It was demonstrated independently by Harvard researchers Tagiuri (1968) and Litwin and Stringer (1968) that organizational climate influences organizational decisions by creating certain kinds of beliefs about what kind of consequences will follow from various actions (Forte, 2011). Climate studied at the team or the unit level has been conceptualized as both a main effect and a moderator, with studies revealing that perceptions about climate are related to performance and attitudinal levels outcomes for both the individual and the team (West & Richter, 2011).

PSYCHOLOGICAL CLIMATE AND ORGANIZATIONAL CLIMATE

This section discusses some distinctions about psychological and organizational climate. Issues related to unit of analysis are discussed in the final section of the chapter. Psychological climate and organizational climate are not homologous, meaning that they do not have the same dimensionality and pattern of relationships with variables of interest (Glick, 1985).

The definition of "psychological climate" used in the research is adapted from Brown and Leigh (1996): "how organizational environments are perceived and interpreted by their employees ... measured in terms of perceptions that are psychologically meaningful to the individual, rather than in terms of concrete organizational features" (p. 359). An individual's reported psychological climate

represents his or her perceptually based, psychologically processed description of his or her particular situation (environment) (James, Hater, Gent, & Bruni, 1978). Psychological climate reflects psychologically meaningful, cognitive representations of events, rather than automatic reflections of specific situational events (James, Hater, Gent, & Bruni, 1978). While organizational climate measures have been employed for the measurement of psychological climate (e.g. Carless, 2004), the research is focused on the individual level of analysis for organizational climate and employs an instrument developed with the organizational climate construct in mind. Note that it is likewise possible to study psychological climate at different levels of analysis, as demonstrated by Biswas (2010), whose research conceptualized psychological climate at both the individual level and the unit level.

"Organizational climate" is commonly defined as the shared perceptions of organizational policies, practices, and procedures (both formal and informal) by individuals who occupy the same workplace. When consensus among individuals about organizational features, events, and processes exists, the aggregated perceptions represent organizational climate (Carless, 2004; Gavin & Howe, 1975; Jones & James, 1979); however, organizational climate as an organizational phenomenon (by the unit of analysis) emerges based on naturally occurring interactions between people (Schneider et al., 1989; Glick, 1985). Glick (1985) argues that organizational climate is the result of sociological and organizational processes, and should be conceptualized as an organizational phenomenon, *not* as an aggregation of psychological climate. It is measured based on the temporary attitudes, feelings, and perceptions of individuals on a number of dimensions, depending on the instrument used, and represents a collective

attitude that is dynamic in nature and is continually produced and reproduced by member interactions (Pool & McPhee, 1983; Glick, 1985).

Organizational climate can be used to determine effective strategies of change and to better understand the context of a behavior within an organization, some of which can be attributed to deep underlying values and assumptions rooted in the organization's culture. According to Edgar Schein, "climate is a surface manifestation of culture" (1990, p. 2). The next section discusses the differences in the two terms.

ORGANIZATIONAL CLIMATE VERSUS ORGANIZATIONAL CULTURE

In the review of the literature, many authors used the terms "climate" and "culture" interchangeably, although the two are separate and distinct concepts (Cameron & Quinn, 2011; Cullen, Victor, & Bronson, 1993; Landy & Conte, 2010; Schneider & Bowen, 1995). This section describes the two constructs in order to provide clarification of what the independent variables of interest intend to measure.

A brief history. The construct of climate was formally introduced in the 1960s, before the construct of culture. Climate is commonly defined as "the shared perceptions of organizational policies, practices, and procedures, both formal and informal" (Carr, Schmidt, Ford, & DeShon, 2003; Reichers & Schneider, 1990). Foundational literature in organizational climate was primarily based on theoretical concepts proposed by Kurt Lewin (Ostroff, Kinicki, & Muhammad, 2013). Litwin and Stringer (1968) define organizational climate as "the sum of perceptions of individuals working in the organization" (p. 66). Another commonly cited definition is offered by Furnham and

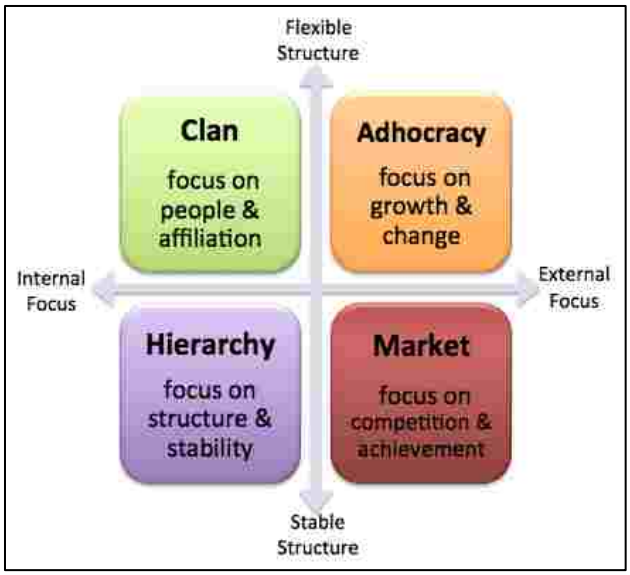
Goodstein (1997): "psychological state strongly affected by organizational conditions, such as systems, structures, and managerial behavior. [It] is a perception of how things are in the organizational environment, which is composed of a variety of elements or dimensions" (p. 164).

Organizational culture was not a popular issue in management literature until the 1980s, although organizations were examined from a cultural perspective as early as the 1930s (Ostroff, Kinicki, & Muhammad, 2013). Tagiuri (1968) provided a comprehensive assessment of the organizational environment, highlighting culture as one of the dimensions of the environment:

- Ecology – physical and material aspects
- Milieu – the social dimension concerned with the presence of persons and groups
- Social system – the social dimension concerned with the patterned relationships of persons and groups
- Culture – the social dimensions concerned with belief systems, values, cognitive structures, and meaning

The Competing Values Framework (CVF) (Figure 2) was a major consideration in evaluating the existing literature. Given the apparent dissonance and discontinuity in the field, especially with regard to organizational culture, CVF is particularly useful in grounding understanding. Although many authors have attempted to articulate the nature of organizational culture, as well as to propose constructs for the theory, the CVF is the most widely used taxonomy in the literature (Ostroff et al., 2003).

Figure 2: Competing Values Framework (adapted from Quinn & Rohrbaugh, 1983).



This construct emerged from the idea that research could be done to establish criteria that would predict organizational performance. The framework classifies culture by two sets of competing values with two bipolar dimensions, resulting in four cells representing culture type. Two-factor models with continuums for structure and focus are ubiquitous in literature from philosophy to psychology to management, and are very robust across a variety of phenomena, including approaches to the thinking, behaving, and organizing associated with human activity. Two examples of this are the Myers-Briggs Personality Type Indicator and Fiedler's Contingency Model. No assumption is made that organizations operate within a single type; rather, they may display a preference for either direction of each axis. Measures applying CVF have been used in over 10,000 organizations globally (Cameron et al., 2006).

Similarities and differences. Organizational climate and organizational culture are similar in that they both describe the ways in which organizational participants experience and make sense of organizations, but each is a unique conceptualization, as climate helps describe what is happening in an organization, whereas culture helps understand why it happens (Carr, et al., 2003; Ostroff, Kinicki, & Tamkin, 2003; Schneider, 2000). Both are fundamental building blocks for describing and analyzing organizational phenomena (Schein, 2000; as cited in Ostroff, Kinicki, & Muhammad, 2013), and it is said that the two are complementary constructs. Table 2 provides a summary of differences in the two constructs found in the literature.

Table 2: Organizational Climate and Culture Differences Cited in Literature.

Climate	Culture	Source
Aspects of the social environment that are consciously perceived by organizational members.	The deep structure of organizations related to assumptions, values, and beliefs, influenced by founders and leaders.	Schein, 1992; Denison, 1996
Can change quickly as it is based on temporary attitudes, feelings, and perceptions of individuals.	Enduring, slow to change, core characteristics of organizations.	Cameron, 2004; Schneider, 1990
Refers to the context in which action occurs (what happens in the organization).	Refers to the meaning intended by and inferred from those actions (why it happens).	Landy and Conte, 2010; Ostroff, et al., 2003
Refers to overt, observable attributes of organizations.	Refers to implicit, often indiscernible aspects of organizations.	Cameron, 2004
People's transitory attitudes about "the way things are."	"The way things are around here."	Reichers and Schneider, 1990, p. 22

According to Sense & Fernando (2011), organizational culture affects "project team participants' development and application of work ethics, acceptance or rejection of particular leadership styles, exercise of power and political ambition, management of resources, creativity, innovation and participation in decision-making, and social responsibility in undertaking project activities" (p. 508). The work of Campbell,

Stonehouse, and Houston (1999) is convergent with this list, citing employee motivation, employee morale, productivity and efficiency, work quality, innovation and creativity, and employee attitudes in the workplace as metrics impacted by organizational culture. If missions are influenced by organizational culture, and the work of engineers has a significant impact on the outcome of a mission, as suggested by Anatatmula (2010), it is also worth studying the relationship between the individual engineer's perception of his/her organization's climate, as well as relationships among job attitudes. While culture is enduring and slow to change, climate is not, and it is a plausible agent of change.

Cameron (2004) suggested that most people are unaware of their culture until it is challenged, until they experience a new culture, or until culture is made overt and explicit through a framework or model: "It is undetectable most of the time because it is not challenged or consciously articulated. Measuring culture, therefore, has presented a challenge to organizational scholars and change agents" (Cameron, 2004, p. 3-4). Some culture researchers incorrectly try to measure culture with quantitative instruments: "The use of employee perceptions suggests that the study had obtained a good measure of organizational climate, rather than organizational culture" (Bernard, 1995, p. 19). Culture refers to the deep structure of organizations related to assumptions, values, and beliefs, whereas climate is behaviorally oriented and concerns "those aspects of the social environment that are consciously perceived by organizational members" (Denison, 1996, p. 24). Hofstede (1991) described it as "the collective programming of the mind which distinguishes the members of one organization from another" (p. 262). It is concerned with "the relatively enduring set of values and norms that underlie a social system" (Furnham & Goodstein, 1997, p. 164).

Differences in research tradition. The agendas of climate and culture researchers differ, just as their research paradigms and methods do. Climate researchers are generally concerned with the impact that organizational systems have on groups and individuals, whereas culture researchers are more concerned with the evolution of social systems over time (Denison, 1996). In addition, the goal of climate research is to determine effective strategies of change, based on the impact of the climate has on its organization or subunit's members. Likewise, the goal of most cultural research is to examine the character or atmosphere in an attempt to describe, explain, and understand (Glick, 1985; Hunsaker & Cook, 1986). In addition, culture research requires qualitative research methods, whereas climate research requires quantitative methods (Denison, 1996).

Their approaches originated from different research traditions, with climate research originating from Lewinian social psychology. This research tradition follows a positivist paradigm, and uses questionnaires to measure perceptions about the organizational environment or situation but does not investigate the meaning or the causes (Hoy et al., 1991; Rentsch, 1990). Organizational culture is, instead, concerned with the conceptual and empirical work of researchers, and originates from anthropological theory (McCarthy, 1998).

Characteristics of work environments brought together under the heading of "climate" in the literature are typically measured through individuals' perceptions of their organization's policies and practices (Ashkenasy, Wilderom, & Peterson, 2000; Patterson, Warr, & West, 2004; Schneider, 1999). Similar research has clarified its focus on "perceived culture", employing similar questionnaires to those applied in climate

studies (Patterson, et al., 2004). Many argue that intuitively, they are the same (Dennison, 1996).

THE NATURE OF ORGANIZATIONAL CLIMATE

Organizational climate provides an appropriate context for studying individual, group, and organizational behavior, and has been linked to diverse factors such as job satisfaction, commitment, psychological well-being, absenteeism, psychosocial risks, and even violence in the workplace (Peña-Suárez et al., 2013). Depending on the context of the research, climate is sometimes operationally defined as an independent variable, an intervening variable (James, Hater, Gent, & Bruni, 1978), or a dependent variable. This research describes organizational climate as a function of both the person perceiving it and his/her environment, otherwise known as Force Field Analysis (Lewin, 1951), and operationalizes it as an independent variable.

According to Schneider and Bartlett (1968), the topic of culture research proceeds on the basis of the environment, as industrial psychology is moving toward adaptation to the environment. Schneider uses the work of both Charles Darwin and B.F. Skinner to defend the idea that radically different forms of behavior in individuals are observed when changes occur in the individual's environment or situation. Research guided by Lewin has also supported this, showing that different forms of behavior emerge when changes occur in the workplace. While one school of thought focuses on differences in individual personality and leadership as the major influences of organizational outcomes, many early industrial psychology researchers argued for a greater appreciation of the possible situational variables that moderate those relationships (Dunnette, 1966; Gilmer,

1966; Korman, 1966). Schneider and Bartlett (1968) refer to the traditional equation for performance prediction in support of this argument: "Performance equals ability plus error. The latter term, error, is the large percent of the variance that is unexplained" (p. 326). This variance was thought to be more easily understood through a "measure of the situation" or environment, by means of a questionnaire (p. 328).

According to Falcione and Kaplan (1984), organizational climate is an assessment of a number of elements at any given moment. "[It is] conceptualized as a surface manifestation of organizational culture that consists of the conscious behavior, such as the feelings or perceptions or attitudes, that is shared by individuals in an organization at a particular time regarding the fundamental attitudes of an organization and that can positively or negatively influence the behavior of organizational members in terms of organizational effectiveness" (Okoya, 2013, p. 47). It is a molar, synthetic, and relatively malleable construct; changes in systems, structures, and managerial style may impact the climate, while enduring group values and norms preserve its stability (Furnham & Goodstein, 1997; Tagiuri & Litwin, 1968).

Organizational factors. It has been argued that climate perceptions are more strongly linked to processes rather than to structural characteristics, and not all situational characteristics are equally represented in an individual's perception of the environment (Lawler, Hall, & Oldham, 1974; James & Jones, 1976; Jones & James, 1979).

Individual factors. "Psychological climate is considered to be a function of perception and cognitive information processing, which suggests not only that perceptual differences may exist among individuals in the same situation, but also that these perceptual differences are psychologically too important to be regarded as error variance,

as unfortunately they have been all too frequently in climate research" (James, Hater, Gent, & Bruni, 1978, p. 786).

TYPES OF ORGANIZATIONAL CLIMATE

Schulte, Ostroff, and Kinicki (2006) suggested that climate could be captured as a "system-wide variable" in an organization, stating that it is emergent in nature, originating in the cognition and perceptions of individuals, and that it is amplified through interactions and exchanges with other unit members to manifest as a collective phenomenon" (p. 647). However, depending on the breadth of the outcome of interest, a focus on measuring specific climate may not be appropriate (Carr et al., 2003).

It is well recognized that multiple climates exist within an organization (Schneider, 2000). Some researchers choose to study facet-specific or domain-specific areas of climate, such as an organization's ethical climate, service climate, safety climate, or innovation climate. For example, Victor & Cullen (1987, 1988) studied the linkage between perceived ethical climate and corporate ethical standards and organizational behavior. The 36-item questionnaire was used to identify distinct ethical climate types, noting that the ethical climate type influences managerial behavior, the determination of which ethical conflicts are considered significant, and the process by which the conflicts are resolved. Types of climate may also be established as aggregate profiles or "molar" climates, reflecting the different measurements on each dimension of the climate construct. The focus of the research is what is referred to in the field as "global climate" or "molar climate."

Depending on the contexts and characteristics of employees and organizations, distinctive global climate dimensions may be of interest (Patterson et al., 2005). Different aspects of climate also emerge as important in different studies (Wilderom et al., 2000). Because aspects of climate that may be relevant to the relational variables of interest are unknown, especially with respect to perceived productivity, a newer concept, it is appropriate for this research study to employ an instrument that measures molar climate.

LEVELS OF ORGANIZATIONAL CLIMATE

The level in which organizational climate is examined refers to the unit of analysis. Psychological climate refers to un-aggregated individual perceptions of employees' environment: "The variation in perceptions that is due to the individual" (Truhon, 2007, p. 153).

The minimum number of individuals needed to produce an aggregated score may vary; for Jones and James (1979), six or more individuals were used to aggregate a work unit. Intergroup agreement should also be required, however, as subunit or collective climates theoretically emerge from consensus among individuals regarding their perceptions of their work environment. This requires a clustering algorithm to empirically define subgroups by perceptual agreement, although conceptually this type of analysis is made challenging when boundaries of department, workgroup, and position are not in alignment (Glick, 1985).

Aggregate climates are typically averaged at some organizational level, reflecting a collective phenomenon, as there is a basic assumption when studying organizational

climate that organizational collectives have their own climate which can be identified through the demonstration of significant differences between units, while having significant agreement in perceptions within units (James, 1982; Patterson, 2005).

DIMENSIONS OF ORGANIZATIONAL CLIMATE

While the definition and articulation of organizational climate is generally agreed upon within the literature, there is also no universally agreed upon set of dimensions or properties which constitute the framework (Patterson, et al. 2005) to measure it. It has been researched in diverse settings, such as businesses, education, hospitals, and government organizations, with no single set of dimensions applying to all environments (Steers, 1977). A set of dimensions chosen for a particular study is subjective and perceptive in nature, and may vary depending on the type of organization and the types of behaviors that are of interest (Litwin & Stringer, 1968; Tagiuri, 1968). There are many dimensions with which organizational climate can be explored; for example, the Organizational Climate Measure by Patterson et al. (2004) defines 17 distinct and measurable facets: autonomy, integration, involvement, supervisory support, training, welfare, innovation and flexibility, outward focus, reflexivity, formalization, tradition, clarity of organizational goals, efficiency, effort, performance feedback, pressure to produce, and quality. Patterson et al. (2004) suggest selecting some combination of dimensions from the 17, though, instead of using all of their instrument's dimensions. Furthermore, differences in organizations may indicate that a different set of dimensions would be more relevant than one previously examined for a different organization (Nicholson, Schuler, & Van de Ven, 1995).

Appendix A provides an overview of the organizational climate instruments which surfaced in the literature review, each with a different set of dimensions of interest, some overlapping. Rather than focus on deriving a unique, fundamental set of climate dimensions, Schneider (1975) recommended acknowledging that dimension salience is only relevant to the researcher questions in the context of a particular criterion. Similarly, it was noted by Tagiuri (1968) that "just about everything may make a difference to behavior, yet to include everything is not useful," (p. 14). Conversely, Pritchard and Karasick (1973) argued that psychological climate (individually perceived organizational climate) is complex, and vigorous effort should be given to utilize an instrument that taps into as many dimensions as possible.

DEFINING PERCEIVED PRODUCTIVITY

Literature has shown that while productivity is "a major concern," it is not the sole indicator of individual or organizational performance; instead, "productivity interacts with other aspects of employee performance, financial controls, innovation, and competitive effectiveness – any one of which can lead to organizational failure" (Ruch, 1994, p. 106). According to Dixon (2000), the concept of performance is incorrectly associated with productivity, stressing that quality and development are more aligned with the notion of performance. As such, while productivity is important, it is possible that an increase in productivity could mean a decrease in performance, for example in a hospital "[if] staff work so hard to meet demands that they do not have the time to either reroute patients to more appropriate forms of care or to think about how the service can be better designed" (Dixon, 2000, p. 1462). This further emphasizes the importance of

operational definitions and metrics for measurement, and the idea that there will never be a silver bullet in organizational research.

According to Bridgman (1927; as cited in Wiik, 2011) a concept should be defined by the unique measuring operations used and not by listing the known properties of the concept. This dissertation subscribes to Ruch's (1994) definition of productivity: the ratio of outputs to inputs in an organizational process, which may measure effectiveness (producing the right products or services), efficiency (the prudent utilization of resources), and quality (meeting technical and customer specifications). In actuality, there are many ways in which an organization may choose to measure productivity "objectively." For example, Abernathy (2011) studied the influence of human resource and management practices on organizational productivity using the measurement variables: "manager span of control (number of nonmanagement employees/number of managers), annual turnover percentage (number of employees leaving/total number of employees), productivity (total labor expense/ total revenue), and productivity (revenue/number of fulltime equivalent employees)" (p. 40). One manager's definition of which metrics or functions of metrics contribute to objective productivity may differ from that of another, even in the same organization and type of work, and in that regard, they are all essentially subjective. Because of this, the term *perceived productivity* (that which is self-assessed by the individual, based on their perceptions, opinions, and experiences) is more accurate in describing what the dissertation research intends to measure. The dissertation research introduces and explores the concept of perceived productivity in novel way, defining it as *"the attitudinal state of an individual derived from the perception that an environment conducive to the effective or efficient use of*

organizational resources and processes is present" and seeks to develop an instrument that will produce a general measure. The next section discusses factors related to organizational productivity found in academic literature.

FACTORS RELATED TO ORGANIZATIONAL PRODUCTIVITY

According to Haynes (2009), "Office productivity is at a formative stage of research, and is an area worthy of research activity" (p. 170). Organizational climate directly affects job satisfaction and has an impact on both individual and organizational productivity (Furnham & Goodstein, 1997). Adler et al. (2009) focused on factors having an effect on the productivity of an organization as a whole, citing the impacts of process optimization, rigidity, and inflexibility, which may also impact learning and innovation. Schwartz and Kaplan (2000) identified several factors that can affect an individual's productivity: a lack or overabundance of information, absence of a clear goal, uncertainty, and extraneous sources of interference, such as random noise, interruptions, or lack of privacy.

Literature on perceived productivity is minimal and has recently been explored in its physical and social aspects, for example lighting, temperature control, interruptions, private areas, and meeting spaces (Haynes, 2009). Haynes (2009) explored perceived office productivity through the following components: comfort, office layout, interaction, and distraction. According to Haynes (2007, 2009), prior research only investigated office comfort (Oseland, 2004; Leaman & Bordass, 2000) and office layout (Becker & Steele, 1995) as contributing factors for productivity. Leaman's (1995) research concluded that individuals who are dissatisfied with temperature, air quality, lighting, and

noise in their work environment are more likely to say that it impacts the productivity of their work performance (Leaman, 1995).

Smith (2009) studied the positive impact of plants in the office environment, noting that individuals working in offices with plants reported higher perceived productivity, higher levels of innovation, and less stress; they also felt more comfortable and healthy. Mak (2012) investigated the impact of noise (sound) and changes in perceived productivity in the office environment. One study by Yang and Zheng (2011) studied the effect of organizational de-coupling on productivity, and found that participation in flexible work programs tends to result in higher levels of self-assessed productivity. Note that the dependent variable is the workers' realization of their productivity potentials, gathered by asking respondents to indicate their level of agreement to the single statement "Conditions in my job allow me to be about as productive as I could be" (p. 304).

Wiik (2011) theorized that the productivity in office buildings is "a function of indoor stimuli, stimuli of the outside world, and unique individual characteristics such as competence, personality, and intelligence" (p. 329). Clements-Croome and Baizhan (2000) found six system factors (indoor environment, weather and outdoor views, organizational aspects, occupational issues, facilities and services, and personal aspects) that have an influence on five human factors (well-being, ability to perform, motivation, job satisfaction, technical competence) that, in turn, influence productivity (p. 631). Other authors have also studied the relationship between the psychological and cognitive functioning aspects of the individual and individual productivity. Khan (1993) found that individual motivation is significantly correlated with productivity. Clements-Croome and

Kaluarachi (2000) discussed the role of concentration as a prerequisite for productivity, stating its dependence on the body being in a healthy state and the mind having "a good sense of well being" (p. 129). Technical competence, effective organization and management, and a responsive environment were also reported as influences on productivity (Clements-Croome & Kaluarachi, 2000).

It is unclear what the relationships between individuals' perceptions about their organization's climate would have with their perceptions of productivity. Objective productivity in manufacturing, measured by performance reports, has shown to be linked to organizational climate (Patterson, Warr, & West, 2004; Patterson et al., 2005), although the *beliefs* regarding productivity have not been investigated in the literature in this context. While the studies discussed in this section are interesting, it is noted that those focusing on the perceived aspect of productivity are not only limited in quantity, but they are also lacking a rigorous form of measurement for the variable, as the next section will discuss.

OBJECTIVE VERSUS PERCEIVED MEASURES OF PRODUCTIVITY

The measurement and analysis of individual productivity in industry serves several purposes (Ruch, 1994). It:

- Provides specific direction and guides the worker toward productive activities
- Monitors performance and provides feedback
- Diagnoses the existence (but not source) of problems, permitting early adjustment and corrective action
- Facilitates planning and control

- Supports innovation

Individual productivity is essential because "it contributes to group productivity, which in turn contributes to organizational productivity" (Ruch, 1994, p. 106). While objective performance is important, human beings often operate on perceptions rather than reality. Yang and Zheng (2011) argued that although objective measures of productivity are often preferred to subjective (measuring perceptions) ones, "self-assessment of productivity actualization is as equally important as objective measures. Who else, after all, is in a better position than one self to know about her or his productivity potential?" (p. 304). Endler and Magnusson (1976) found that "the meaning an individual assigns to a situation appears to be the most influential situational factor affecting his or her behavior" (p. 967). The human element is equally relevant, if not more so, since organizations do not function without human beings.

When Wiik (2011) investigated the effects of indoor and outdoor stimuli, as well as personal attributes, on self-assessed productivity, the measure was represented by two statements: (1) "I efficiently perform my work tasks" and (2) "I think that I am productive at work" (p. 333). While the statistical basis for doing this was evident, many authors strongly advise having three variables per factor, as having less than three is generally weak and unstable (Costello & Osborne, 2005; Anderson & Rubin, 1956). Mak (2012) also implemented only two Likert scale agreement questions in the study related to sound level in the office environment: (1) "Your office environment reduces your productivity at work" and (2) "Noise in your office reduces your productivity at work" (p. 341).

Research on job attitudes and perceived productivity is also extremely limited. Kramer and Hafner (1989) designed and administered the Nursing Work Index (NWI), a 65-item Likert scale designed to measure four variables: work values related to job satisfaction (JSV), work values related to perceived productivity (PPV), job satisfaction (JS), and perception of an environment conducive to quality nursing care (PP). The investigators defined perceived productivity as "the attitudinal state of an individual derived from perception that an environment conducive to producing quality nursing care is present" (p. 173). This was measured based on the individual's personal performance report. The NWI was later shown to have validity issues, and is now considered to be outdated and no longer relevant. In addition, the revised NWI no longer measures job satisfaction or productivity of quality care (Kramer & Schmalenberg, 2004).

As the literature review has demonstrated, no instrument for perceived productivity providing a general measure currently exists in academic literature. Organizational climate and affective commitment also have not been previously explored in the research on perceived productivity. An opportunity exists to investigate perceived productivity in a new way: through creation of a generalizable instrument which can be used to explore its relationship with organizational climate and affective commitment.

RELEVANCE OF AFFECTIVE COMMITMENT

Perceptions of organizational climate are strongly correlated to a number of job attitudes (Patterson et al., 2004), two of the most significant being job satisfaction and organizational commitment (Randhawua & Kaur, 2014). Randhawa and Kaur (2014)

suggested that more organizational climate research is needed, in particular as it relates to job attitudes, since this factor contributes to many organizational outcomes.

Meyer and Allen (1991) identified three types of organizational commitment in their Three Component Model of Commitment: affective, continuation, and normative. Many researchers in this area argue that positive organizational commitment, including feelings of affiliation, attachment, and citizenship behavior, tends to improve organizational efficiency and effectiveness by contributing to resource transformations, innovativeness, and adaptability (Zeffane, 1994). Of the three forms of commitment, affective commitment is considered to be the most desirable and the one that organizations typically strive to instill in their employees (Krishna, 2008). Bahrami et al. (2016) discovered a connection between organizational climate, measured by the Organizational Climate Description Questionnaire (Halpin & Croft, 1963) and organizational commitment, measured by the Meyer and Allen (1997) instrument. A study by Dorgham (2012) showed the positive relationship between organizational climate (using the researcher's own questionnaire that measures six different facets) and organizational commitment, also using the Allen and Meyer instrument. Lau, Terpstra Tong, Lien, and Hsu (2017) demonstrated that the relationship between ethical work climate and affective commitment is mediated by the perception of organizational politics, and concluded that improvement in ethical climate can strengthen an organization's competitive advantage.

RESEARCH FLAWS OF LINKS TO OUTCOMES

Bartram, Robertson, and Callinan (2002) identified four kinds of performance identified as potential outcomes associated with organizational climate: economic (productivity, profitability, etc.), technological (the development of new products), commercial (market share, market niche), and social (the effects on customers and suppliers). These four facets of general performance outcomes are strongly interrelated and, as such, organizational climate is an important area of research, particularly because it can be used to facilitate organizational change initiatives.

Many other studies have attempted to link organizational climate to predicted outcomes in attempts to increase understanding. Patterson et al. (2005) warns of the haphazard nature of this development of declared knowledge, as it appears to lack synergy and does not lead to theory development. In addition, many studies use different measures of climate that assess rather different dimensions (as shown in the previous sections) as well as different statistical techniques to analyze their data. It has also been demonstrated, as well as stated, in the literature that many instruments lack validation, are poorly designed, and fail to specify the level analysis (Patterson et al., 2005). Causal interpretations of the observed relationships also depended on cross-sectional research designs and were not measured longitudinally, which is preferred, although it is not always feasible. (Wilderom, Glunk, & Maslowski, 2000, Patterson et al., 2004).

Still, it is difficult to draw conclusions when different studies employ different performance measures. In additional, many intervening variables have been identified (Kopelman, Brief, & Guzzo, 1990) – so many, in fact, that it is no wonder that researchers in this field have such difficulty establishing correlations, since many are

intertwined concepts. In acknowledgement of these risks, careful consideration has been given to instrument selection, as discussed in Chapter 3.

RESEARCH UNIT OF ANALYSIS

For decades, there has been an ongoing debate as to whether or not individual perceptions of climate can be deduced from measures of organizational climate, because some researchers assert that climate is a "byproduct of naturally occurring interactions among people, and as such irreducible to an individual level analysis" (McMurray, 1994, p. 3). While this is an understandable concern, Murray (1994) asserts that this is more of an aggregation issue, and almost all instruments empirically derive measures of organizational climate from aggregated member perceptions (McMurray, 1994). In mitigating this obstacle, consideration of the data collection and use, as well as the phrasing of the survey items, are strategies to preserve the unit of analysis (Schneider & Reichers, 1983).

Glick (1985) argued the appropriateness of climate researchers to acknowledge multiple units of theory and analysis: "At a minimum, individual, subunit, and organizational units of theory and analysis should be recognized. Organizational and subunit climates provide the context in which psychological climate may be understood" (p. 603). As such, studies on climate and relationships to job attitudes were reviewed at multiple levels, as demonstrated in the literature review.

Deciding the unit of analysis for a particular research study often depends on *how* the data can be collected, and whether or not an appropriate agreement level can or should be reached for interpretation of the results. Organizational-level correlation can be

stronger than, weaker than, or equal to individual correlation, depending on factors such as the individual variation within organizations and the correlation within organizations (Ostroff, 1993). The unit of analysis may also depend on the goals of the research. Because perceived productivity is a relatively unexplored construct in academic literature, it is the opinion of the researcher that it should explored at the individual level first, rather than aggregated at the team, unit, or organizational level. This study employs the individual as the unit of analysis by collecting data from individuals who may or may not be employed by the same organization or department. In the main study, an instrument used to measure organizational climate is employed without first aggregating the results. In this way, perceived organizational climate (or psychological climate) will be measured on the individual level, as will perceived productivity and affective commitment.

CHAPTER 3

RESEARCH METHODOLOGY

The research methodology details the overall approach to the entire process of the research study (Collis & Hussey, 2009). Research methodology refers to "the procedural framework within which the research is conducted" and should be chosen as a function of the research situation. (Amaratunga, Baldry, Sarshar, & Newton, 2002, p. 18). Durkheim (1895; as cited by Checkland, 2000) advocated that the traditional scientific method is inadequate as a way of injuring into human situations. Instead, a research methodology, or a body of methods to be used in research, should be adopted in the researcher's approach. According to Keating (2009), methodology is not a sequential set of steps; rather, methodology offers a general, high-level framework, with sufficient detail to guide the formulation of the generalized approach by which to address a problem.

This chapter covers the overall research methodology, research questions and research strategy by which they will be explored, research paradigms, and variables of interest and methods by which they can be measured, including the review of instruments, reliability, and validity. Rationale for the research methodology is also explained in this chapter.

METHODOLOGY OVERVIEW

The unique methodology proposed for this research implements a deductive framework to test the existence of a relationship of a variable (perceived productivity)

among other variables; however, it contains an inductive element, as the research requires the creation of an instrument by which to obtain a general measure of perceived productivity. In this sense, the research methodology is classified as an *exploratory sequential mixed methods* approach, "a design in which the researcher first begins exploring the qualitative data and analysis and then uses the findings in the second quantitative phase" (Creswell, 2014, p. 226). Creswell (2014) continues, "in effect, the researcher employs a three-phase procedure with the first phase as exploratory, the second as instrument development, and the third as administering the instrument to a sample of the population" (p. 226).

RESEARCH STRATEGY

According to Saunders, Lewis, and Thornhill (2009), selection of the appropriate research strategy should be based on research questions and objectives, the extent of existing knowledge on the subject matter to be researched, the amount of time and resources available, and the philosophical underpinnings of the researcher. It provides the overall direction of the research including the process by which the research is conducted (Remenyi et al., 2003) and details "the general plan of how the researcher will go about answering the questions" (Saunders et al., 2009, p. 600).

Yin (2003) recommended selection of a research strategy based on the type of research question, the extent of control held by an investigator over actual behavioral events, and the degree of focus on contemporary or historical events, suggesting that some aspects may be more advantageous than others depending on the research study. Buchanan and Bryman (2007) explain that the selection of the research method is not only shaped by the aims of the research, epistemological concerns, and norms of practice;

instead, choice is influenced by a system of interrelated factors, including organizational, historical, political, personal, evidential, and ethical factors. Explanations are provided for the guiding factors of choices throughout the research methodology, to fulfill the obligation of acknowledging relevant factors.

Given that the research study is exploratory in nature, the following guidance was helpful: "In any investigation that isn't explicitly exploratory, we should be studying few independent variables and even fewer dependent variables, for a variety of reasons" (Cohen, 1990, p. 1304). Because perceived productivity, defined in the context of the research and measured using its own general instrument, has not explicitly been linked to any distal (upstream) or proximal (downstream) variables, and because of the exploratory nature of the research, it was appropriate to seek a molar construct for organizational climate.

There are countless quantitative techniques and designs available to address research questions. Matching analysis and design to the research question becomes a complicated task with the increasingly complex analytic and design strategies available to researchers. In many cases, complex designs and analytic strategies are necessary to effectively address research questions; yet a simpler, classic approach may provide both elegant and sufficient answers to the research questions (Wilkinson & the APA Task Force, 1999). The American Psychological Association task force (1999) recommends that the principle of parsimony be applied to the selection of designs and analyses, such that the minimally sufficient design and analysis is chosen.

Although complex methods are often necessary to achieve research goals, there are several reasons for choosing a simpler method when possible. In comparison to other methods achieving the same purpose, simpler designs and analyses are typically based on

the fewest and least restrictive assumptions; are less prone to errors of application and errors are more easily recognized; and provide results that are easier to communicate to both the scientific and lay communities (Wilkinson & the APA Task Force, 1999). In addition, it is also recommended that a methodology be chosen which will be understandable and relatable to others publishing in the same context, as is multiple regression (e.g. Patterson et al., 2005).

The study proceeds in three stages. In the first stage, content analysis (Krippendorff, 2013) was used to explore the dimensions of perceived productivity to identify themes of perceived productivity and to define the characteristics of productivity that may be perceived by an individual in an organization. Stage one concluded with the development of an instrument, by use of qualitative data, permitting operationalization of the dimensions of perceived productivity. In the second stage, a pilot study was conducted to allow quantitative analysis for instrument refinement and enhanced validity and reliability of the instrument for use in the main study. In the third stage, perceived productivity was explored as a moderator variable in order to assess possible linkages to predictor variable (organizational climate) and outcome variable (affective commitment), and the study concludes with avenues for future research to guide a new research stream in perceived productivity.

RATIONALE OF METHODOLOGY

The study of mixed methods research applications is still in its infancy (Teddlie & Tashakkori, 2009). The central premise of using mixed method approaches is that "the use of quantitative and qualitative approaches in combination provides a better understanding of research problems that either approach alone" (Creswell & Plano Clark,

2007, p. 5). Within the mixed methods community, the use of multiple approaches involves dominant and supportive approaches, depending on the extent to which the researcher uses the quantitative and qualitative approaches equally or one to a greater extent than the other (Mertens, 2014; Teddlie & Tashakkori, 2009).

Much of the prevailing organizational research was historically dominated by hypothetico-deductive methods, although the growing trend is to embrace new approaches beyond the typical quantitative approaches of the positivist worldview (Buchanan & Bryman, 2007). The research begins with an inductive approach; however, a purely qualitative approach is not appropriate for two reasons. First, qualitative approaches require a large number of case studies to be conducted to produce generalizable results (Schein, 1990). They may be limited in their ability to contribute towards hypothesis testing and theory building because of the amount of time and expenses required (Bernard, 1995). Second, qualitative approaches are also generally reserved for the study of organizational culture, whereas the research tradition for the organizational climate studies tends to be quantitative. Similarly, a purely quantitative (in this case, survey-based) approach is not possible because the second research question requires operationalization of the variable perceived productivity, for which a scale for measurement has still not yet been defined.

Justification of a mixed method approach begins with acknowledgement of the multi-purpose nature of the research, as well as an alignment of the research questions, purposes, and methods (Mertens, 2014), as shown in Table 3 and Table 4:

Table 3: Instrument Development Purpose and Methods

Research Question	Purpose	Methods	Supporting Sources
What instrument can be developed to measure an individual's perceived productivity within their organization?	An instrument for the general measure of perceived productivity does not exist; hence, one will be developed to measure an individual's level of perceived productivity within their organization.	Content analysis involving qualitative data collection from literature to synthesize themes of the construct and align survey questions. Review panel and pilot study to enhance validity and reliability of instrument for use in main study.	Krippendorff, 2013; Snyder, 1997; Creswell, 2014; Mertens, 2014

Table 4: Moderated Regression Purpose and Methods

Research Question	Purpose	Methods	Supporting Sources
Does perceived productivity moderate the relationship between organizational climate and affective commitment? If not, to what extent do relationships exist between these variables?	Demonstrate perceived productivity as an operationalize variable, which can be measured for analysis to help explain organizational behavior and to generate possible hypotheses for future research.	Moderated multiple regression in SPSS and PROCESS add-on.	Baron & Kenny, 1986; Hayes, 2009; Whisman & McClellan, 2005; Aiken & West, 1991; Cohen & Cohen, 1983

PROPOSED INSTRUMENTS FOR MEASURING VARIABLES OF INTEREST

Criticism of Climate Instruments. The typical way of performing climate research is through aggregate measures of the individual's perception of the organizational climate (Tustin, 1993; Verwey, 1990). As demonstrated in the review of organizational climate instruments reviewed (Appendix A), there is a great deal of variation in climate dimensions employed in different measures, which attributes largely to the apparent lack of a theoretical basis for many climate instruments, as well as to a result of some aspects of climate deemed more significant in different studies (Patterson et al., 2005; Wilderom, Glunk, & Maslowski, 2000).

The approach used for the research study depends on the interests of the researcher's investigation (Ashkenasy et al., 2000). While multidimensional, global

approaches can provide an overall snapshot of the organization's climate, domain-specific approaches contribute to more precise and targeted information for when a specific area of evaluation or potential improvement has been identified as an interest to a particular study (Patterson et al., 2005), such as a climate for customer satisfaction, safety, or innovation. Schneider (1996, 2000) suggests that the use of general measures of climate will inevitably contain dimensions that are not significant to a specific study. Patterson et al. (2005) encourages the use of both approaches if it is relevant to the study to provide a valid basis for the investigation of work environment perceptions.

While many instruments claim to be designed to measure organizational climate, in many cases the unit of analysis is the individual and not the organization (Schneider, 1975). Furnham and Goodstein (1997, p. 165) outline the following considerations that they believed to be paramount in the development of an instrument. It should:

- Be comprehensive and covering all salient dimensions of climate without being but overlong or redundant
- Be highly reliable, showing strong internal consistency
- Have established validity, i.e. clear evidence that it does measure organizational climate
- Travel well: it can be used in different types of organizations and different cultures, permitting comparisons of the same or different companies internationally.

Schneider (1981) recommends carefully and precisely instructing survey respondents to approach climate items by describing what they believe actually happens in the work setting rather than how they feel about it. "Prior to completing climate items, they should

be told that they will have a chance to indicate how they feel about things at a later point in the survey" (p. 11).

Review of Existing Climate Instruments. Many authors have cited existing measures of organizational climate. While the purpose of this research was not to produce a topology of climate instruments, much consideration was given to the task of evaluating existing instruments to select one to administer for the study. First, an initial literature search for existing climate instruments was performed (Appendix A). The instruments mentioned by climate researchers in review of other climate instruments (not found in the first search) were also located for review, to produce the most complete list possible for this research study. It is believed that saturation has been achieved in this effort.

Climate instruments intended for a specific purpose, to be issued to a specific type of organizational employee or within a specific industry, were omitted, as the scope of the research is to provide a broad overview of the research subjects' organizational climates using an instrument intended for generalizable use. For example, *The Survey of Management Climate* by Gordon and Cummins (1979) was not included in the review of climate instruments because it was designed to measure a type of climate (as opposed to molar), whereas the focus of this study is on molar climate. Likewise, instruments which focus on facet-specific climates, such as ethical climate, safety climate, and innovation climate, were not considered in the review of climate instruments.

The table of climate instruments reviewed (Appendix A) was populated by recording information (dimensions, number of items, focus, sample to which it was administered, reliability, and validity data) about all instruments that surfaced in the literature review, while also using some authors' reviews of instruments (e.g. Furnham &

Goodstein, 1997; Kraik, 1981; Manning, 2010; Peña-Suárez et al., 2013; Chiang, Martín, & Núñez, A, 2010) as a guide to find even more instruments which might be possible candidates for the measurement of organizational climate in the research. The only criterion for inclusion was that the instrument be used to measure molar organizational climate. Although several organizational climate instruments are available for use, as demonstrated in the review in the previous section, Furnham and Goodstein (1997) warn that only a handful have the formal psychometric properties necessary for proper research and that many have not been standardized on a broad international population. Careful consideration was given to selecting a reliable, validated instrument for the measure of organizational climate.

Recall that the unit of analysis is the individual, although organizational climate instrument participant data are often aggregated. Unless individual level random error and sources of bias are clear, an organizational climate measurement of aggregated data should yield high perceptual agreement about the organization's climate, and can be assumed to be reliable and valid (Glick, 1985). Still, this is a concern in studies focusing on subunit or organization level of analysis that rely on accurate informant data, while the issue is avoided in focusing on the individual.

Organizational Climate Scale (CLIOR). Peña-Suárez et al. (2013) developed an empirically valid and reliable ($\alpha = 0.94$) scale that obtains a general measure of organizational climate. The instrument was selected from the vast collection of climate instruments reviewed in the literature. The scale grouping the various facets assessed (e.g. cooperation, work organization and relations, innovation, participation) provides a global indicator for organizational climate, by generating a score on one scale instead of a profile made up of composite subscale scores. The one-dimensional instrument was

developed empirically "without discarding any of the facets that historically make up organizational climate" (Peña-Suárez et al., 2013, p. 138). It was assessed for validity and reliability in a survey of a broad sample of 3,163 individuals of various professions including nurses, technicians, and administrative staff (Peña-Suárez et al., 2013). The short version of CLIOR (18 items) allows a rapid screening, which was another major selling point, given the fact that the main survey also included two other instruments to measure the other research variables. Questionnaires longer than 50 questions tend to cause survey fatigue and poor data response (Reynolds, 2010). Employing the short version of CLIOR allowed the main survey to be only 46 questions after all three instruments and demographic questions were included.

General Measure of Perceived Productivity. No general measure for perceived productivity currently exists in the literature, so one must be created for this study and validated in a pilot study. Ahire and Devaraj (2001) advocated the use and development of measurement instruments to examine causal relationships among constructs constituting theoretical frameworks as a critical strategy for advancing engineering management research. A primary goal of the research is to create a first-generation, general measure of perceived productivity. Why then, is it necessary to test the developed construct of perceived productivity? Ahire and Devaraj (2001) explain:

> Constructs are latent variables that must be measured indirectly through a set of observed indicators/variables. Constructs, rather than the individually observed indicators, enhance our conceptual understanding of the investigated phenomena. Hence, in theory development and testing, our real interest is more in the relations among the constructs than it is in the relations among observed variables (p. 319).

It is important to develop an instrument with sufficient attention to quality, because "once a defective measure enters the literature, subsequent researchers are reluctant to change it" (Wilkinson & the APA Task Force, 1999, p. 596). The inherent risk is that results based on relatively invalid or unreliable measures can accumulate in academic literature, especially in a new area of research. As such, special care must be given to ensure that the developed instrument is a valid and reliable measure.

Scale development using content analysis. Qualitative content analysis is a widely used and flexible qualitative research methodology used to interpret meaning from the content of text data (Hsieh & Shannon, 2005; Cavanagh, 1997; Tesch, 1990). It refers to a collection of analytic approaches ranging from impressionistic, intuitive, interpretive analyses to systematic, strict textual analyses (Rosengren, 1981). Similar to grounded theory, it is more commonly used in social sciences and humanities, though researchers are beginning to apply it in other fields, including organizational research (Duriau, Reger, & Pfarrer, 2007) as well as in legal, political, medical, and commercial applications (Krippendorff, 2013). This research falls under conventional content analysis (as opposed to directed or summative content analysis), in which coding categories are derived directly from the text data. The directed approach begins with a theory or relevant research findings as guidance for initial codes, and a summative content analysis involves counting and comparisons (e.g. keywords or content) followed by the interpretation of the underlying context (Hsieh & Shannon, 2005).

Qualitative content analysis involves focusing on relevant aspects of the data related to the research question by means of data reduction (Cho & Lee, 2014; Schreier, 2012). The approach differs from that of grounded theory because the focus is not to develop hierarchies or to discover relations among categories (Cho & Lee, 2014).

Content analysis may be either deductive or inductive, depending on researcher circumstances: an inductive approach is appropriate when prior knowledge is limited or fragmented, whereas the deductive approach begins with preconceived codes or categories derived from prior relevant theory, research, or literature (Cho & Lee, 2014). In this research, the approach is inductive. The data analysis process involves selecting the unit of analysis, categorizing, and finding themes from categorizing (Cho & Lee, 2014).

Relevance sampling in content analysis aims to select the textual units that contribute to the answering of a given research question, and is also known as purposive sampling (Krippendorff, 2013). In response to the first research question, *what instrument can be developed to operationalize perceived productivity, to obtain a general measure?* The development of the instrument items to assess an individual's perceived productivity is the goal for the content analysis. Thus, a *re*peated *search* within data for generalizations related to the concept of perceived productivity in the available literature was conducted.

In content analysis, sampling units emerge in the process of reading and allow the researcher to derive meaning, including the words and phrases distinguished for selective inclusion in the analysis (Krippendorff, 2013). Recording and coding relies on coding instructions, increasing the likelihood of valid inferences; interpretations will be the same if the content analysis were to be repeated, and thus reliability is enhanced. To avoid reliability problems such as ambiguity of word meanings and category definitions as identified by Weber (1990), strict adherence to the text samples was maintained in identifying terms associated with the notion of perceived productivity, as shown in Appendix B.

Scale validation and verification. As described in the methodology overview, the proposed research methodology is broken down into three stages. The first two pertain to the development of the instrument for the general measure of perceived productivity, and are described in this section. The research methodology is classified as a variation of *exploratory sequential mixed methods* as described by Creswell (2014). Following the chosen method for qualitative data analysis, content analysis was used to analyze data collected from literature, by means of an evaluation from at least ten subject matter experts (both doctoral students and those with doctorates in of engineering management) with expertise in organizational research and experience in the engineering management industry and academic field, in order to assist in establishing face validity. In the second phase, the instrument was refined using qualitative data from the peer review to enhance external validity.

The overview of this plan shows steps occurring sequentially, as shown in Table 5:

Table 5: Overview of Plan for Initial Development of Instrument.

Task description	Data source	Purpose and contribution to research objectives	Evaluation methods, tools, or metrics
Content analysis	Literature review, panel feedback	Derive construct themes, propose dimension structure, and scale items for perceived productivity instrument	Reviewer feedback from doctoral students and graduates, academic faculty, industry, and organizational researchers to support triangulation and member checking; face and content validity
Pilot survey	Participant data	Piloting will be used to perform validation and reliability analysis, and decrease likelihood of measurement error in the main study	Pilot data enables confirmatory factor analysis, internal consistency using Cronbach's alpha and item analysis by analyzing regression weights for small loadings to identify items with insufficient covariance with other items in a subscale, stability analysis (test re-test)

Here is an overview of the plan for the scale was developed and verified (Table 6).

Table 6: Validity and Reliability Verification Plan.

Task (what)	Purpose (why)	Method/tool (how)	Strategy or metric for evaluation	References
Derive construct themes (scale construction)	Propose dimension structure and initial item generation	Content analysis, colligation and generalization through literature review	Inspection, inductive inference	Snyder, 1997; Suhr, 2006
Verify the construct themes and readability of items	Establish face validity	Interviews, expert/peer reviews	Triangulation of data from literature and feedback	Creswell, 2014
Administer "pre-test" items in pilot survey	Establish construct validity and internal consistency	Collect pilot data from population and perform Exploratory Factor Analysis	Reliability analysis to check the homogeneity between variables; check if items adequately reflect dimensions of specified instrument	Creswell, 2014; Hertzog, 2008
Assess factor structure of measurement instrument	Establish external validity	Administer survey in main study and perform Confirmatory Factor Analysis on main survey data	Demonstrate factorial invariance.	Hoelter, 1983; Munro, 2005; Suhr, 2006
Verify reliability of instrument on new sample	Verify internal consistency	SPSS to calculate Cronbach's alpha	Alpha 0.60 (acceptable), 0.70 (preferred) or greater And inter-item correlations, noting the factorially distinct dimensions	Hair et al., 2006; Steiner, 2003
Demonstrate that perceived productivity exists as an individual variable, which can be measured against other variables for use in external study	Establish conclusion validity	SPSS; Moderated regression model	Various; does perceived productivity measure correlate with expected variables? (e.g. Autonomy, Satisfaction, and Affective Commitment)	Gelman & Hill, 2007; application shown in Patterson et al., 2005;

Note that much of the analysis comes after the main study has occurred. According to Hertzog (2008), the goals of a pilot study do not typically include the development of a new instrument; rather, they are used for checking the performance of items of a previously developed instrument with a new population.

Affective Commitment Scale. The Affective Commitment scale from Meyer and Allen's (1997) Three Component Model of Commitment was used to measure affective commitment. This instrument has been validated on over 40 samples containing well over 16,000 participants from a wide variety of organizations and many occupations. It can be used separately from the Three Component Model. It has an internal reliability of $\alpha = .84$ (Hawkins, 2005). It also possesses construct (convergent and discriminant) validity, and cross-cultural validity (Alam, 2011).

CONDUCTING SURVEYS AT TARGET POPULATION

The focus of this research study was on perceived productivity, hypothesizing it as a moderating variable to potentially explain its influence in employee commitment levels. Survey research, targeted at employed individuals recruited by SurveyMonkey, was conducted. The pilot study group data was used to refine the research-based instrument for assessing perceived productivity. The researcher recruited individuals from participating engineering professional groups and organizations for half of the sample, and the rest were recruited from SurveyMonkey. Individual data collected on 103 participants was used to validate the scale and to assess its reliability, as well as to refine it for use in the main study.

The main survey questionnaire was sent to participants via electronic mail SurveyMonkey.com, which recruited full-time and part-time employed individuals from

various populations. A strong diversity of the sample was desired in order to produce and test a generalizable scale for the measure of perceived productivity.

The main survey contains four sections: the Organizational Climate Scale (CLIOR – Appendix C), developed by Peña-Suárez et al. (2013), which provides a measure of positive or negative molar climate; the researcher's developed instrument for the general measure of perceived productivity (GMPP – Appendix D), and the Affective Commitment Scale (ACS - Appendix E) from Meyer and Allen's (1997) Three Component Model of Commitment. Each of the instruments was presented separately and required input from the participant on Likert scales assigned in each section. The last section on demographics (Appendix F) contained only choice data.

Anonymity and voluntary participation. The survey input data did not provide any opportunity for participants to disclose personal or confidential information. It was made clear from the outset that participation was purely voluntary. It was assumed that individuals who did not complete the survey in its entirety (e.g. if they chose to skip any entries) did not wish to fully participate in the survey, so their responses were omitted in the analysis.

Sample size, power, and effect size. A major goal of the research study was to evaluate the latent factor structure of the developed instrument using exploratory factor analysis. Munro (2005) suggested that a minimum of five participants per variable be used in the analysis, while Suhr (2006) suggested between five and twenty per factor. Hoelter (1983) recommended a total of 200 observations, in order to increase the likelihood of accurate results. Adequacy of sample size can also be determined by considering the characteristics of the data determined by sampling adequacy statistics (KMO and Bartlett's test for sphericity), communality values, and factor loadings

(correlations between variables and factors) (Hartas, 2015). Field (2009) provided factor-loading recommendations for exploratory factor analysis based on sample size.

The sample size for the main study is dependent on population size, (Bordens & Abbott, 2011), to be determined once participants are recruited. Soper's (2015) a priori sample calculator for regression was used to investigate possible scenarios for the main study based on sample size, probability level, and effect size, as shown in Table 7.

Table 7: Participants Required for Regression Scenarios.

Statistical power	Probability level	Anticipated effect size (Cohen's f^2)	Sample Size required for one predictor (simple regression)	Sample size required for two predictors (multiple regression)
0.8	.05	.35	25	31
0.8	.05	.25	35	42
0.8	.05	.15	54	67
0.8	.05	.05	156	193
0.8	.01	.35	37	45
0.8	.01	.25	50	60
0.8	.01	.15	81	97
0.8	.01	.05	234	280

There are some implications of determining the sample size, power, and effect size. An increase in small reported effect sizes among large samples is a negative growing trend in management literature as relevance and rigor are routinely traded for power (Combs, 2010). As questioned ironically by Combs (2010): "Can we really suggest that managers should change their decision calculus on the basis of knowledge that some new variable explains .0025 percent of the variance in organizational performance?" (p. 9). Management scholars should, instead, seek to identify a greater magnitude of effect size in order to explain variance in outcome measures.

Sample size and distribution are even more critical to the research methodology and analysis than determination of whether or not it is appropriate to use parametric statistics (Jamieson, 2006). Null hypothesis significance testing is often misconceived as meaning that, given a data set, the probability of the null hypothesis may be true; in fact,

what it really tells us is the probability that the data could have arisen if the null hypothesis were true, possibly as a result of extreme or erroneous data (Cohen, 1994). As such, it is the responsibility of the researcher to design the experiment strategically, in order to use the collected data most productively.

The researcher is also responsible for being careful in drawing inference from any test statistics close to the critical value (Pell, 2005). Many argue that .05 is an acceptable standard, but a strong focus on research design, instrument design and selection, reliability, and validity may make it possible for even stronger relationships (.01 or .005) to be observed, which are clearly of greater interest. Because no pilot data on perceived productivity exists, nor have similar studies been conducted in the area of general measure perceived productivity, realistic expectations for level of power were not known a priori, although a value of 0.8 is considered to be a good level of statistical power to aim for (Field, 2009).

Cohen (1990) comments: "The sample size doesn't affect the unit weighted correlation because we don't estimate unstable regression coefficients" (p. 1306). One possible strategy for increasing the number of available cases in the main study is to simply purchase more participants from SurveyMonkey.com. Regardless of how many participants, the sample size will not affect the unit-weighted correlation because unstable regression coefficients are not estimated (Cohen, 1990). According to Cohen (1988), standardized effect size measures, such as *d* and *f*, developed in power analysis are dependent on the population variability of the dependent variables, which may depend on a number of uncontrollable factors and thus are unknown about a particular data set until it is collected.

Anticipated rate of response. Standards for response rates exist because of the potential impact on the validity and reliability of survey results. Avoiding low response rates is critical in obtaining high-quality survey data and can bolster statistical power, reduce sampling error, and enhance the universality of results (Hardigan, Popovic, & Carvajal, 2015). The consequence of survey nonresponse is known as nonresponse bias. When individuals who fail to respond differ substantially from those who do, it becomes difficult to predict how the entire sample would have responded, meaning that there is greater risk in making predictions through generalization about the population as a whole. The difference can influence the external validity of the research, or the extent to which an observed relationship between variables "should be generalized to and across different measures, persons, settings, and times" (Calder, Phillips, & Tybout, 1983, p. 240). While response rate is only one of the factors of external validity, the researcher cannot ensure the conditions have been met when response rates are low (Sivo, Saunders, Chang, & Jang, 2006).

Whether or not an individual participates in a survey is largely due to cost-benefit analysis, meaning that people are more likely to respond to surveys when they feel the rewards outweigh the costs. Besides the overarching factor, the following reasons have been identified: salience of the topic, survey fatigue, and mode of data collection. Delivery method is another widely cited factor in response rate, although the response rate has been shown to vary, depending on the targeted population (Hardigan, Popovic, & Carvajal, 2015). The cost effectiveness and turnaround associated with web-based surveys greatly outweigh the unconfirmed benefits of postal mail surveys in the context of the research. Other cited factors potentially influencing the nonresponse rate are survey length, item placement, and gender. While the length of the survey utilized in the

research is fairly long, research is inconclusive regarding the influence of questionnaire length on survey response (e.g. Cottrell et al., 2015; Heberlein & Baumgartner, 1978). Burchel and Marsh (1992) found that length affects rate of response, but not the occurrence of missing and/or incomplete data. Response favorability was found to increase when demographic questions were placed at the end of the research survey (Roberson & Sandstorm, 1990).

One method of mitigating nonresponse bias is to focus less on increasing the rate of response, and instead to "understand the causes and correlates of nonresponse and to make adjustments based on that understanding" (Tourangeau & Plewes, 2013, p. 51). Nonresponse error is also an important issue and can be mitigated by using a feature in the online survey builder to prompt the participant before he/she submits incomplete responses. Nonresponse weighting adjustment methods may be needed, in order to ensure the completeness of response, such as the ratio mean. Most adjustments assume that data is either missing at random (MAR) or missing completely at random (MCAR). For this assumption to be made, the percentage missing for each question should vary minimally, so that no items appear to be favored. Ideally, the majority of cases would not contain missing data.

Population sample and generalizability. Because a major focus of this research study is to develop a psychometrically sound instrument to be used in many settings and contexts, a survey services provider was used to recruit a heterogeneous sample of currently employed individuals to participate in the survey. This strategy simultaneously mitigates sampling error (i.e. the extent to which the precision of sample survey estimates is limited by the number of persons surveyed) and coverage error (the extent to which the sample drawn does not include all elements of the population) (Field, 2009). Neither the

identity of the participating individuals themselves nor details about their place of employment were identified in the data collected from the web-based survey.

VALIDITY AND RELIABILITY IN RESEARCH DESIGN

Validity and reliability in research design influences the extent to which generalizations can be synthesized about a phenomenon under study in order to be applied in other settings, influences the probability that statistical significance will be found in the data analysis, and influences the extent to which meaningful conclusions can be drawn from the data (Leedy & Ormond, 2013). Both validity and reliability reflect the degree to which error exists in measurements (Leedy & Ormond, 2013). Various evidence for validity and reliability is relevant to the research, "depending on the nature of the research problem, the general methodology the researcher uses to address the problem, and the nature of the data that are collected" (Leedy & Ormond, 2009, p. 29). The type of validity relevant to the research depends on the objectives of the study (Radhakrishna, 2007).

Mixed method designs often encounter many validity issues, primarily in the qualitative stage, if the qualitative data lacks rigor or occurs simply at the theme level without further data analysis steps associated with using a purely qualitative research design (Creswell, 2014). Concerns related to instrument development arising from the design include failure to take advantage of the richness of qualitative findings and not using appropriate steps to develop a good psychometric instrument (Creswell, 2014).

Instruments used in the research study should also demonstrate validity in a variety of forms to more effectively make use of the data set and to strengthen the results of the conclusions of the research. Face validity is the extent to which a test is

subjectively viewed as covering the concept it is intended to measure at face value. Although it relies on common sense and is difficult to measure, it is "the gatekeeper for all other kinds of validity" and is often highly reliable (Krippendorff, 2013, p. 330). The qualitative phase employing content analysis relies heavily on face validity because content analysis is fundamentally concerned with the readings and interpretation of text, which, in turn, relies on individual judgment (Krippendorff, 2013). The quantitative methods used rely heavily on statistical conclusion validity to suggest the appropriateness of the statistical methods used to develop the research instrument and to perform the moderation analysis.

Internal validity is related to the design of the research study and can be threatened by misuse of experimental procedures, treatment, or experiences of the participant that prevent drawing accurate inferences from the data (Creswell, 2014). It describes "the extent to which the detected effects on the operationalized outcome are due to the operationalized treatment rather than to other competing cases", whereas external validity describes "the extent to which the effects we observe among operationalized constructs can be generalized to theoretical constructs other than those specified in the original research hypothesis" (Judd & Kenny, 1981, p. 20). Campbell (1986) suggests that confusion over these concepts can be addressed by renaming them: "Internal validity can more aptly be termed 'local molar causal validity'. More tentatively, the 'principle of proximal similarity' can be substituted for the concept of external validity" (p. 67). External validity is related to how well the results of the experiment can be generalized to the intended population outside the research sample (Van de Ven, 2007).

Construct validity refers to "degree to which a test measures what it claims, or purports, to be measuring" (Brown, 2000, p. 8). It is related to the extent that the scores serve a useful purpose and have positive consequences when used in practice (Humbley & Zumbo, 1996, as cited in Creswell, 2014) and it involves making the general case of operationalizing a construct. Convergent validity is "the degree to which multiple attempts to measure the same concept are in agreement" meaning that "two or more measures of the same thing should covary highly if they are valid measures of the concept" (Bagozzi, Yi, & Phillips, 1991, p. 425). Discriminant (or divergent) validity refers to the degree to which measures of different concepts are distinct, meaning that measured concepts do not correlate if they are not expected to be related to each other (Campbell & Fiske, 1959). Both convergent and divergent are required to establish construct validity (Campbell & Fiske, 1959).

Content validity refers to "the evidence that the content of a test corresponds to the content of the construct it was designed to cover" (Field, 2009, p. 783). According to Leedy and Ormond (2013), it is "the extent to which an instrument measures a characteristic that cannot be directly observed but assumed to exist based on patterns in people's behavior" (p. 90). An instrument is considered to possess content validity "when the items adequately reflect the process and content dimensions of the specified objectives of the instrument, as determined by expert opinion" (Benson & Clark, 1982, p. 793). The researcher should confirm that the items measure the content they were intended to measure (Creswell, 2014); however, additional research may be needed to improve the developed instrument.

Research conclusions may be doubted for any of the following reasons and may represent concerns that question the validity of social research (Judd & Kenny, 1981, p. 20):

- The theoretical constructs of the hypothesis are not adequately operationalized (failure to provide sufficient evidence for of construct validity).
- The research design employed is not sufficiently precise or powerful enough to enable the detection of causal effects among the operationalized constructs (failure to provide sufficient evidence for of conclusion validity).
- The detected effects on the operationalized outcome are because of factors in the research other than the treatment (failure to provide sufficient evidence for internal validity).
- The generalizations from the research to other constructs, those not operationalized, are inappropriate (failure to provide sufficient evidence for of external validity).

The next section discusses the strategies used to ensure validity and reliability throughout the research methodology.

STRATEGIES FOR VALIDITY AND RELIABILITY

There are many possible strategies that a researcher can employ to enhance validity and reliability in mixed methods research (both inductive and deductive). The more strategies that a researcher actively implements throughout the execution of the research methodology, the greater the likelihood that the results will be significant

(Creswell, 2014). This section outlines the checks for the credibility and accuracy of findings throughout the research methodology process.

Strategies in Instrument Development. Content analysis will be used in the inductive stage of the first research phase (instrument development). Face validity is important in content analysis, due to the subjective nature of reading and interpreting of text as it relies on individual judgment (Krippendorff, 2013). Triangulation and member checking will be used to gather enhance research validity, which involves gathering information from different data sources by examining evidence from the sources and using it to build a coherent justification for themes within a construct (Creswell, 2014). Several sources of data and perspectives from researcher contacts (Ph.D. candidates and professors in the organizational research field) involved in the process add validity to the study. Member checking will also be used to determine the accuracy of qualitative findings through taking the final descriptions of construct themes back to interview participants and determining whether or not they feel that the results are accurate (Creswell, 2014).

Deductive strategies are also implemented during the quantitative development of the instrument which utilize statistical tools and inferences. The selection of a diverse, random sample helps to enhance internal validity by ensuring that participants with certain characteristics have a probability equal to the general population of being in the sample (Field, 2009). For example, to survey only adults with depression could impact the results, because a negative outlook might potentially mean that their perceived productivity levels will generally be low in one or more areas, regardless of other factors. External validity could be assessed by testing both the pilot sample and the main survey

sample for similarity in factor loadings, in order to see if there is reasonable evidence that the results would be consistent in other random samples and with the population at large.

Two types of validity are needed to establish construct validity: convergent and divergent validity (Campbell & Fiske, 1959). They will be measured internally using the inter-item correlation matrix. The assessment checks whether high scores close to 1.0 occur for questions that are related and are expected to correlate (convergent validity) and whether low scores close to 0.0 occur for questions that are not related and are not expected to correlate (divergent validity).

Internal consistency can be measured for the scale and subscale using coefficient alpha for reliability analysis to evaluate it for use (Field, 2009). Failure to consider and take to heart the guidelines available for enhancing validity and reliability, especially with respect to developing an instrument versus and evaluating it for future use, does an enormous disservice to the communities whom the researcher wishes to inform.

Strategies in Instrument Application. The potential of any given data set to provide meaningful information by the means of statistical tools is ultimately up to the researcher and the decisions made regarding the research methodology: "There is no royal road to statistical induction...the informed judgment of the investigator is the crucial element in the interpretation of the data" (Cohen, 1990, p. 1304). In exploratory factor analysis, internal validity is especially at risk because of the vast amount of decision-making that it entails, including the choice of principle components analysis versus principle axis factoring, the type of rotation (e.g. orthogonal, oblique), interpretation of eigenvalues and scree plots, factor retention, and others (Conway & Huffcut, 2003). Clarity in reporting the choices and procedures were documented to the best extent possible.

Validity of results also relies on whether the assumptions for factor analysis are met. Strategies to enhance validity and reliability with respect to instrument development and selection were implemented in the research methodology to the best extent possible, in order to improve the likelihood of external validity.

DESIGN FOR QUALITATIVE STUDY

Qualitative data analysis leads the initial development of an instrument, permitting operationalization and measurement in the pilot survey. In the first phase of the research, content analysis with academic literature as the data source (Krippendorff, 2013) is used to explore perceived productivity and to define the characteristics that may be perceived by an individual about the organization where he or she is employed. Triangulation involves gathering information from different data sources and perspectives by examining evidence and using it to build a coherent justification for themes within a construct (Creswell, 2014). The instrument was then reviewed by organizational researchers enhance instrument validity. Member checking was used to assess the descriptions of construct themes and to establish the face validity of qualitative findings. The construct was reviewed by participants in order to determine the accuracy of the interpretations and the triangulation, as well as the consistency of synthesized themes throughout the development of the instrument (Creswell, 2014). The outcome of the qualitative study was the initial research instrument, designed to provide a general measure of perceived productivity.

DESIGN FOR QUANTITATIVE STUDY

This section describes the quantitative methods used in the research in greater detail. First, methods used in Phase 1 to reduce the initial items of the research instrument using data from the pilot study are discussed. Next, Phase 2 outlines how moderated multiple regression was performed using data from a separate, larger population, in a main survey.

Dimension Analysis and Data Reduction. There are two approaches in exploratory factor analysis which are used to reduce variable data and to identify the underlying dimensions of a data set: principle components analysis (PCA) and principle axis factoring, also called common factor analysis (CFA) (Floyd & Widaman, 1995). The techniques differ in the estimations of the communalities used in the analysis, and differences arise from those calculations (Field, 2009). PCA is used to detect the linear components within the data and to show how the data variables contribute to the components detected; CFA is used to derive a mathematical model based on estimated underlying factors (Field, 2009). Differences also exist in the goals of the researcher: "The goal [of principle axis factoring] is to discover optimal weightings of the measured variables so that a large set of related variables can be reduced to a smaller set of general summary scores that have maximal variability and reliability...The goal of data reduction is typically achieved by use of principle components analysis" (Floyd & Widaman, 1995, p. 287). Guadagnoli and Velicer (1988, as cited in Field, 2009) concluded that the solutions in both PCA and CFA were nearly identical. Nunnally and Bernstein (1994) agreed: "One draws almost identical inferences from either approach in most analyses" (p. 11). Stevens (2002) found that in some circumstances this is not true, such as when

fewer than 20 variables are present or when there are low commonalities (< .40) Field cautions that PCA is psychometrically sound and is far less complex than CFA.

Conway and Huffcutt (2003) suggest that the decision to use PCA instead of CFA is whether the EFA is used primarily for data reduction (pragmatic use) or for interpretation of variables in terms of latent constructs (theoretical use). Because the primary goals are data reduction, PCA was employed in this analysis to extract the underlying factors, although CFA can be run as well to see if a difference exists, which often happens (Field, 2009). Regardless, organizational researchers still tend to make interpretations of the data, rather than to simply reduce the data (Conway & Huffcutt, 2003).

Principle components analysis. The basic steps for conducting PCA are outlined in Mvududu and Sink (2013, p. 81):

1. Collect data
2. Screen data
3. Check for EFA assumptions
4. Compute the intercorrelation matrix
5. Extract initial set of factors
6. Determine the number of factors
7. Rotate factors for a final solution
8. Interpret factor structure, naming factors based on conceptual underpinnings

The assumption of normality is most important for generalizing results beyond those drawn from the sample population (Field, 2009); in this case, that refers to the pilot sample. Factor structure can still be checked in on the second sample drawn to mitigate any concern of non-normality. However, "assumption of normality is not required for PCA when the purpose is to summarize relationships between variables" (Shannon et al., 2011, p. 4; Tabachnick & Fidell, 2013). Both KMO and Bartlett's test are used to indicate that the data is suitable for factor detection, and if they are low, more data may

be needed or fewer variables should be used (Field, 2009; Yong & Pearce, 2013). The Kaiser-Meyer-Olkin (KMO) statistic provides a measure of sampling adequacy: a value between 0.6 and 0.7 is mediocre, between 0.7 and 0.8 is good, between 0.8 and 0.9 is great, and above 0.9 is superb (Field, 2009). The Barlett's Test of Sphericity should be statistically significant (less than .05) (Hooper, 2012). The anti-image correlation matrix should also be assessed to verify that values on the diagonal of the matrix are above .50 and that distinct and reliable factors can be produced from the sample (Yong & Pearce, 2013).

Next, the intercorrelation matrix is computed. Items that are conceptually related will strongly correlate (from .40 to .85) and will load the cluster and load to one or more of the same interpretable dimensions (Hooper, 2012). Communality values range between 0 and 1 and represent "estimated proportion of variance of the variable that is free of error variance and is shared with other variables in the matrix" (Yong & Pearce, 2013, p. 81-82). Values close to one mean that a variable has random variance or has no specific variance; close to zero mean that a variable does not share any variance with other variables (Field, 2009). Communality values above .80 are very high and are indicative of a very robust dataset (Hooper, 2012). In social sciences, magnitudes of .40 to .70 are more common, and communalities of less than 0.40 may indicate that a variable is not related to other variables (Costello & Osborne, 2005). Communalities are more relevant to CFA than to PCA, but high values may indicate that the results of CFA and PCA will be the same (Suhr, 2006).

Factor rotation is used to improve the interpretability of underlying factors. The method for factor rotation in the analysis is orthogonal, also known as varimax, which attempts to maximize the dispersion of loadings within factors (Field, 2009). According

to Field (2009), the choice should be made based on whether or not the underlying factors should be related, although orthogonal rotation is still recommended as a preliminary analysis of the data because it is easier to interpret. Fabringer (1999; as cited in Conway & Huffcutt, 2003) disagrees, suggesting that oblique rotations result in simpler, more interpretable solutions. Conway and Huffcutt (2003) discuss the overuse of orthogonal rotation in the majority of organizational research, explaining that correlation among factors is more likely to occur than the researchers suspect, and that orthogonal rotation forces an unrealistic situation (uncorrelated variables) and distorts loadings from a more simple structure. To resolve the dilemma, if moderate-high correlations among variables exist, oblique rotation can be run separately to compare the factors and loadings (Towler & Dipboye, 2003).

In detecting factors, the factor loadings for a sample size of 100 should be above .512 (Field, 2009). The scree plot provides a visualization for interpreting how many factors to retain by examining where the graph begins to bend like an elbow and flatten (Floyd & Widaman,1995; Field, 2009; Mvududu & Sink, 2013). Because this can be subjective, in a preliminary analysis, consideration of eigenvalues may be more helpful, and retention of factors with eigenvalues over 1.0 is recommended (Floyd & Widaman, 1995; Field, 2009). While conservative judgment was used in observing the $\lambda > 1.0$ and scree plot tests indicators for factor retention, both methods are said to over-extract factors and cannot be fully relied upon in factor analysis because they rely heavily on researcher judgment (Henson & Roberts, 2006). After variables are eliminated, additional factor rotations can be run.

Quality checks on the instrument following the factor analysis procedures include testing its reliability. Coefficient alpha represents the extent that related variables

measure the same underlying factor: between 0.70 and 0.80 are acceptable, although even higher (above .90) is better (Field, 2009).

A summary of the quality checks to take place during the factor analysis are given in Table 8:

Table 8: Summary of Quality Checks During Factor Analysis

Inquiry	Purpose	Threshold	Reference
Check KMO & Bartlett's values	Measures of sample adequacy determine if it is suitable for structure detection.	KMO above 0.6; Bartlett's significance below .05	Field, 2009
Examine anti-image correlation matrix	Additional measure of sample adequacy to determine if distinct and reliable factors can be produced.	Diagonal elements on anti-image correlation matrix above .50	Yong & Pearce, 2013
Assess communalities	Measure the estimated proportion of variance that variables share with all other variables without error variance.	All interpreted variable values above .40	Costello & Osborne, 2005
Check total variance explained	Provide an assessment of whether or not the construct is valid.	At least 60% of the variance of a sample should be explained.	Hair et al., 2013
Assess factor loadings	Variables should positively correlate with the underlying dimension extracted to an extent that should be interpreted.	All interpreted variable values above .512	Field, 2009
Check eigenvalues	Estimate how many factors to extract.	Consider interpreting factors with eigenvalues greater than 1.0	Floyd & Widaman, 1995; Field, 2009
Check scree plot	Estimate how many factors to extract.	Consider only extracting factors before and at the bend of the elbow, not after the graph flattens.	Floyd & Widaman, 1995; Field, 2009
Check internal consistency	Coefficient alpha represents the extent that related variables measure the same underlying factor.	Coefficient alpha should be above .70 and preferably even higher (above .90).	Field, 2009
Analyze inter-item correlations	Supports an internal assessment of convergent and divergent validity.	Items that are conceptually related will strongly correlate (from .40 to .85) and will cluster and load to one or	Hooper, 2012

		more of the same interpretable dimensions.	

The outcome of the first research phase is the operationalized variable, perceived productivity, which can now be measured using the developed instrument. Its internal consistency score can be computed to ensure reliability. The resulting instrument was used in an application described in the following section.

Moderated Multiple Regression. Moderated multiple regression was used to address the second research question. For each individual participant, measures on the organizational climate scale, as well as values for perceived productivity and affective commitment, are computed. Composites for each variable are generated as an aggregate of the cases and then are included in the moderated multiple regression model. The variables are assessed for normality using skewness, kurtosis, Q-Q plots, and histogram plots, although normality is not necessarily a required assumption for the regression, as it is very robust (not sensitive to false positives) even with minor deviations from normality (Glass, Peckham, & Sanders, 1972). The individual constructs are also assessed prior to the analysis for validity based on the sample drawn, using the component matrices to confirm values are above .40.

The purpose of the moderation model is to examine the effect of a moderating variable on the relationship between two other variables: the independent variable and dependent variables, by generating two separate linear models and evaluating their difference (Baron & Kenny, 1986). The first model examines the relationship between the relationship between the independent variable and the dependent variable and the relationship between the moderator variable and the dependent variable. In the second model, the same two linear relationships are evaluated, as well as the relationship

between the product of the independent variable and moderator variable against the dependent variable. The conceptual diagram (Figure 3) and statistical diagram (Figure 4) provide a visual representation of moderation:

Figure 3: Moderation Model: Conceptual Diagram (Adapted from Hayes, 2013).

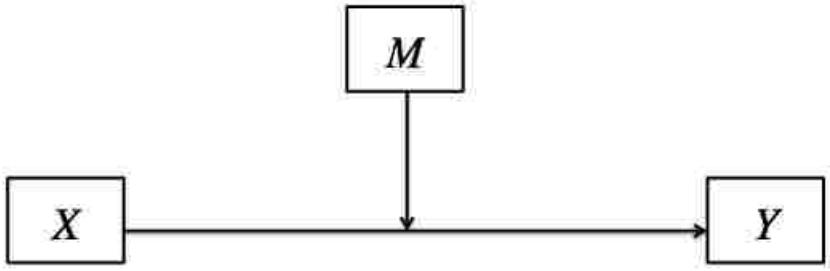
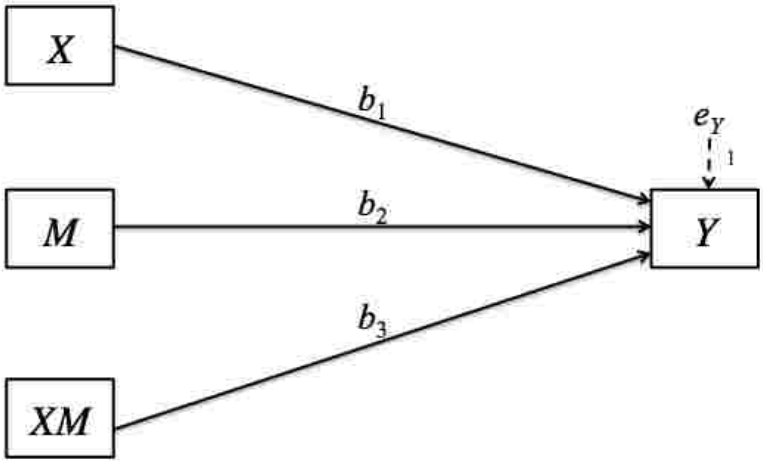


Figure 4: Moderation Model: Statistical Diagram (Adapted from Hayes, 2013).



In the research model, perceived productivity is hypothesized as a moderating variable. A variable functions as a moderator a casual relation exists between two variables; the relationship changes as a function of the moderating variable. In the research model, statistical analysis measures and evaluates the differential effect of organizational climate on affective commitment as a function of perceived productivity. The following methods can be used for testing whether the difference between the additive and moderator models is statistically significant: (i) testing whether the increment in the squared multiple correlation (R^2) is significantly greater than zero (0.30 or higher is standard in behavioral research), (ii) testing whether the moderator coefficient differs from zero and is significant (p less than .05), and (iii) testing whether the partial correlation between the moderator product and dependent variable (while controlling for the independent and moderator variable) differs from zero (Whisman & McClelland, 2005). If the interaction variable strengthens the relationship between organizational climate and affective commitment, then the relationship between organizational climate and affective commitment is moderated by perceived productivity.

The following table (Table 9) summarizes the researcher's procedure to test for moderation:

Table 9: Procedure to Test for Moderation.

Step	Task
1	Construct a new variable X*M defined as the product of the independent variable X and the proposed moderator variable M.
2	Test the model first without the interaction term, using X and M as predictor variables, with Y as the criterion variable.
3	In a second model, test the model with the interaction term. Now, there should be three separate predictor variables: X, M, and X*M, tested against the criterion variable, Y.
4	If the interaction term is significantly different than 0, M is a moderator variable, and different levels of M will change or strengthen the relationship between X and Y. If moderation is suspected, perform other tests and inquiries to confirm this assessment.

Moderation can be further investigated using the PROCESS by Andrew F. Hayes add-on in SPSS. The code conducts an inferential test where:

H_0 = the difference between conditional effects of X is equal to zero;

H_a = the difference between conditional effects of X is different from zero.

The Johnson-Neyman technique can also be applied in this step to calculate the numeric range that the moderator variable is significant in the data (Hayes, 2012).

Note that minimal collinearity is an assumption of ordinary least squares to reduce measurement error (Cohen et al., 2003). The models' collinearity statistics are assessed by observing the variance inflation factor (VIF) and the tolerance (reciprocal values), which provide an indication of how much (or what proportion) of each independent variable's estimated variance is shared with other independent variables. Rules of thumb for interpreting values of VIF in the literature vary and suggest that values exceeding 4 or 10 indicate that the results of the regression are excessively large, meaning that there are inflated standard errors of regression coefficients (O'Brien, 2007). Using the conservative cutoff value for VIF, the equivalent threshold for tolerance would be 0.25 (O'Brien, 2007). Tolerance is equal to 1 minus R^2, the amount of variance in each independent variable explained by all of the other independent variables (O'Brien, 2007).

A summary of the quality checks to be performed during the moderated multiple regression are provided in Table 10:

Table 10: Summary of Quality Checks During Factor Analysis

Inquiry	Purpose	Threshold	Reference
Check skewness and kurtosis	Values close to zero for skewness and kurtosis indicate that data is normally distributed.	Absolute value of each divided by their respective standard error; Possible minor concern if they are significant at z = +/- 1.96 (p <.05).	Field, 2009
Assess histograms for the variables	Bell curves for the variables indicate the data is normally distributed.	Possible concern if bell-shape is not detected in the histograms.	Field, 2009
Evaluate component matrices for all variables.	Confirm that the validity of the construct is maintained in the sample drawn.	Values of variables should be above .40	Field, 2009
Check VIF and tolerance	Reduce measurement error in the measurement of effects by assessing the collinearity statistics.	VIF below 4, tolerance above .25	O'Brien, 2007
Assess variable regression coefficients	Regression coefficients that are significant are included in the model.	Regression coefficients statistically significant at p < .05	Whisman & McClelland, 2005
Assess R^2 change and significance	The amount of variance in each independent variable explained by all of the other independent variables should increase a statistically significant amount if a variable is a moderator.	Change in R^2 should be significant at p < .05	Whisman & McClelland, 2005
Run Hayes	Compute values for	Examine the graph for a	Hayes, 2012

PROCESS macro	interaction plots between predictor and criterion variables at different moderator values.	change in slope at different levels of the moderator variable.	
Apply Johnson-Neyman technique	Calculate the numeric range that the moderator variable is significant in the data.	A range should be defined for cutoff values of where the moderator is significant in the data for proper interpretation of the findings.	Hayes, 2012

STATISTICAL ANALYSIS

The initial assumption to use parametric statistics for the analysis of this research was guided by the literature on the level of measurement, also known as the scale of measurement, originating from the criticism surrounding the typology proposed by Stevens (1946) which describes all measurement in science as belonging to four different types of scales: nominal, ordinal, internal, and ratio. According to Jamieson (2006), many authors in the past have either been unaware of or have failed to acknowledge the inappropriateness of performing parametric testing and analysis on data generated through surveys implementing Likert scales, which they claim to be ordinal data. These authors contend that because Likert scales are ordinal data, the use of means, standard deviations, ANOVA, and other parametric statistics are inappropriate, and instead argue for the use of nonparametric statistics on ordinal data. The argument has been around for more than half a century (e.g. Lord, 1953) despite the continued common and prevalent use of parametric statistics for the analysis of Likert-scale survey data in the social science domain.

Pell (2005) argues that the issue of appropriate statistical models for parametric versus nonparametric data exists primarily in understanding of the nature of the analyses

and the resulting inferences. Others have suggested that the misconception exists because many authors participating in this "great debate" have misrepresented the emergent properties of Likert *scales* (which transform ordinal data into interval data), while correctly arguing that Likert scale *items* are, in fact, ordinal data (Brown, 2011; Carifio & Perla, 2008). In additional support of the intervalist position, data obtained using Likert scales can be analyzed with maximal sensitivity and power using parametric statistics (Blackwell, 2006). While there is often an equivalent non-parametric test, the parametric counterpart is more powerful (Pell, 2005). Furthermore, the acceptability of applying parametric techniques in the instance of this research relies on the assumptions made and the appropriate size and shape of the data.

The following key assumptions are necessary for parametric statistics: randomness of the data, independence of the data, homoscedasticity (constant variance of errors), and use of minimally interval data (Pell, 2005). If these circumstances exist, it is appropriate to make conclusions based on the data set using parametric techniques, irrespective of the measurement process by which the data is generated. In fact, blatant deviation from the alleged requisite assumptions (e.g. normality) tends to have little influence on the validity of the parametric statistics: According to Harris (2014, p. 31), "the validity of parametric statistics is often affected very little by even relatively gross departures from [the usual assumptions made for parametric data]" (p. 31).

Pell (2005) suggested that the major issues affecting statistical inference are those of bias and lack of independence of the data, as they are difficult to quantify. In the case of the measurement of moderating variables, there is inherent risk of Type II errors due to low statistical power arising from tests for interactions that are "less powerful than tests for main effects in the same designs" (Hedges & Pigott, 2004, p. 427). As such,

calculation of the indirect effect is necessary to minimize the risk of a Type II error (false negative), which can be calculated in SPSS (Hayes, 2009; MacKinnon, 2008).

Osborne and Waters (2002) described four assumptions of multiple regression that researchers should always test for: (1) normal distribution of variables; (2) assumption of a linear relationship between the independent and dependent variables; (3) variables are measured reliably and without error; and (4) homoscedasticity holds. Williams, Gómez Grajales, and Kurkiewicz (2013) later addressed misconceptions of their work and restated the four assumptions of multiple regression to test for: (1) existence of linearity in the model parameters; (2) accurate assumptions about model errors, including zero conditional mean of errors, independence of errors, homoscedasticity (constant variance) of errors, and normal distribution of errors; (3) accurate assumptions about measurement errors, in particular in measuring the predictor variable; and lastly (4) issues of multicollinearity and outliers.

While the assumptions seem intimidating, comfort can be found in the fact that it is not even possible to investigate all of the assumptions without estimating the actual regression model of interest itself: "It is a common misconception that assumption checking can and should be fully completed prior to the running of substantive analyses; in reality, assumption checking should be an ongoing process throughout any data analysis" (Williams, Gómez Grajales, & Kurkiewicz, 2013, p. 9). However, in the event that the data appears to be unfit for parametric statistical analysis, bootstrapping is a valid, nonparametric technique that can be used for testing a moderation model in substitution of the previously described method; it can also mitigate a circumstance where the sample size is small, by means of resampling with replacement (Preacher &

Hayes, 2004). Research has shown that power may sometimes be sacrificed, but that, in many cases, the difference is negligible (Hayes, 2009).

EXPECTED RESULTS AND ANALYSIS OF RESULTS

The researcher expected that content analysis will be successful in producing an initial set of items intended to measure perceived productivity. A pilot study of the instrument was conducted for further evaluation and refinement, using participant data to enhance overall validity and reliability of the instrument prior to operationalization. The goal is that sufficient validity and reliability will be observed so that it becomes reasonable to assume that the instrument can be used in a wider application involving other variables of interest and using a different sample. If not, the survey items may need to be revisited using additional qualitative inquiry, or a new sample will be used to improve the instrument.

In the second stage of the research methodology, perceived productivity was explored as a moderating variable to assess the influence of the relationship between the predictor variable (organizational climate) and the outcome variable (affective commitment). The study of moderation is important in statistical analysis for analyzing effects that are different among different population subgroups. The moderator variable indicates when or under what conditions strength or change in direction of a relationship can be expected, and is defined as "a qualitative (e.g. sex, race, class) or quantitative (e.g. level of reward) variable that affects the direction and strength of the relationship between an independent or predictor variable and a dependent or criterion variable" (Baron & Kenny, 1986, p. 1174). Even though the relationship between organizational climate and affective commitment is likely to exist (based on the review of the literature),

it can be shown whether or not the presumed relationship will change based on the moderating effects of variables. The moderator's effect is the interactions that demonstrate the degree to which the relationship between the independent variable and dependent variable depends on the value of the moderator variable (Hedges & Pigott, 2004).

The test of the moderating effect involves the statistical comparison of the additive (Equation 1) and moderator models (Equation 2):

$$Y = b_0 + b_1 \mathrm{X} + b_2 \mathrm{M} \qquad (1)$$

$$Y = b_0 + b_1 \mathrm{X} + b_2 \mathrm{M} + b_3 \mathrm{X}\times\mathrm{M} \qquad (2)$$

There are several possible methods for testing for moderation. Two equivalent methods are utilized in the research: (1) test whether the increment in squared multiple correlation (ΔR^2) is significantly different than zero, and (2) test whether the coefficient b_3 differs from zero (Whisman & McClelland, 2005). To interpret the moderation regression model, three separate regression lines are provided using the Andrew F. Hayes PROCESS model are provided to relate the independent variable (organizational climate) to the dependent variable (affective commitment) for each level of the moderator variable (low, medium, and high perceived productivity).

It is possible that perceived productivity might not reveal any indication of being a moderating variable of the previously demonstrated relationships between organizational climate and job attitudes. This would not be considered a failure, as the adopted methodology allows for opportunities for perceived productivity to expose itself as both a predictor and an outcome variable in the development of the instrument and the collection of the data.

The purpose of this final stage of the research is three-fold: (1) demonstrate the applicability of the developed instrument to be operationalized in a practical setting; (2) guide future development of the theory and instrument through increased awareness of what perceived productivity is and its ability to impact individuals and organizations; and (3) generate hypotheses to be tested for future research.

CHAPTER 4

RESULTS

This chapter discusses the results of the applied research methodology discussed in Chapter 3. The section addresses the outcomes of the research questions defined in Chapter 1 and is divided into two main phases. The outcome of Phase 1 is the development of the General Measure of Perceived Productivity (GMPP). Phase 2 outlines the results of the application of the instrument developed in Phase 1. The GMPP was used to operationalize perceived productivity as a research variable in the main survey to investigate the influence of perceived productivity on the relationship between organizational climate (independent variable) and affective commitment (dependent variable).

PHASE 1 RESULTS: INSTRUMENT DEVELOPMENT

The first research question asked: *what instrument can be developed to operationalize perceived productivity, to obtain a general measure?* Both qualitative and quantitative methods were employed in Phase 1. The following four sections outline the results of the qualitative research methods and those of the quantitative pilot study, which contributed to the development of the General Measure of Perceived Productivity.

QUALITATIVE CONTENT ANALYSIS

Qualitative methods were first employed in the development of the GMPP. The EBSCO Discovery Service was used to locate text data related to the research, which maintains subscriptions to 57,000 journals and over 555,000 books. The following key words and combination of keywords were used in the searches: productivity, perceived productivity, subjective productivity, self-assessed productivity, workplace productivity, office productivity, and organizational productivity. Text sources that addressed productivity in the way that the research question addressed it were included in the analysis. Due to the limited amount of published literature on the subject, it was not necessary to utilize software in the qualitative analysis, which is primarily an approach used when the ability to process large volumes of data at high speed is needed (Krippendorff, 2013). In either case, by hand or by software, the principles of analytical process are the same (Patton, 2014), and semantically valid reading is intuitively satisfied by traditional content analysis, whereas computers are limited in this regard (Krippendorff, 2013).

The goal of the qualitative content analysis approach was to make inferences regarding how individuals perceive productivity. The research technique involved

systematically evaluating, interpreting, and coding academic literature to generate themes and to articulate survey items based on the findings (Appendix B). The result was the developed operational instrument for measuring individual perceived productivity. From this model, identified characteristics associated with perceived productivity can be used to generate survey questions. Twenty-nine survey questions that intended to capture the extent to which an individual perceives productivity in the subjective sense, as interpreted in the literature using relevance sampling and conventional coding (Krippendorff, 2013; Hsieh & Shannon, 2005; Cho & Lee, 2014), , were initially written. The employed method demonstrates internal construct validity support for the research instrument.

PILOT STUDY

A pilot study of 103 participants was conducted to validate the GMPP. Approximately half of the participants were recruited from the American Society of Engineering Managers. The remaining half were recruited from SurveyMonkey.com, a self-serve survey platform designed to create, deploy, and analyze surveys through an online interface. It is commonly used by students and researchers to conduct academic research (Appendix O). SurveyMonkey also offers a paid service to recruit survey participants; this was utilized to build a sample of individuals who identified as being either part-time or full-time employed.

The pilot study provided initial data used to refine the GMPP prior to its application in a larger survey and research study (Phase 2 of the research).

EXPLORATORY FACTOR ANALYSIS

The goal of performing exploratory factor analysis (EFA) is to explain many variables by minimal factors through data reduction (Meyers, Gamst, & Guarino, 2013). As discussed in Chapter 3, there are two types. Principle component analysis was performed in the study, although common factor analysis (CFA) was also conducted in parallel, with the results reported in Appendix P.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value of 0.840 (Table 11), which is considered "great" (Hutcheson & Sofroniou, 1999; as cited in Field, 2009, p. 646). The KMO value indicates that the factors extracted in the first factor analysis run account for a substantial amount of variance in the samples.

Table 11: KMO and Bartlett's Test for Five-Factor Solution.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.840
Bartlett's Test of Sphericity	Approx. Chi-Square	1955.731
	df	406
	Sig.	.000

The Bartlett's Test value indicates the homogeneity of variances. The level was well below the recommended threshold of .05 (Field, 2009). The two tests demonstrate that the data is suitable for structure detection. The anti-image correlation matrix (Appendix G) was also assessed to confirm the assertion, by checking that values on the diagonal of the matrix were above .50 (Yong & Pearce, 2013).

The orthogonal (Varimax) rotation method was used to maximize the dispersion of loadings within factors and as a preliminary analysis; it was also assumed that underlying factors would not necessarily be related (Field, 2009). Five factors were

extracted that explain 68.454% of the total variance of the sample (Table 12). In the social sciences, at least 60% of the variance of a sample should be explained, in order for a construct to be valid (Hair et al., 2013).

The procedure groups the items that are answered similarly by individual participants together into factors. The total variance explained by each factor shows the strength of the factor in how well the items vary together.

Table 12: Total Variance Explained for Five-Factor Solution.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.779	33.720	33.720	9.779	33.720	33.720	5.450	18.795	18.795
2	4.609	15.894	49.614	4.609	15.894	49.614	4.282	14.767	33.561
3	2.860	9.863	59.477	2.860	9.863	59.477	3.840	13.241	46.803
4	1.470	5.070	64.547	1.470	5.070	64.547	3.233	11.149	57.952
5	1.133	3.907	68.454	1.133	3.907	68.454	3.046	10.502	68.454
6	.935	3.223	71.677						
7	.840	2.898	74.575						
8	.731	2.520	77.095						
9	.677	2.335	79.430						
10	.606	2.091	81.521						
11	.537	1.850	83.371						
12	.492	1.697	85.068						
13	.465	1.604	86.672						
14	.460	1.585	88.256						
15	.434	1.496	89.753						
16	.374	1.288	91.041						
17	.352	1.215	92.255						
18	.332	1.145	93.400						
19	.291	1.003	94.403						
20	.271	.934	95.337						
21	.243	.837	96.174						
22	.206	.709	96.883						
23	.194	.668	97.552						
24	.173	.596	98.148						
25	.150	.516	98.664						
26	.146	.503	99.167						
27	.107	.370	99.538						
28	.089	.307	99.844						
29	.045	.156	100.000						

Extraction Method: Principal Component Analysis.

The unrotated component matrix is provided in Table 13 and the rotated component matrix in Table 14. Each of the five factors had five or more components with loadings above .512, which exceeds the threshold suggested by Field (2009) for a sample of 100 (sample size was 103).

Table 13: Unrotated Component Matrix for Five-Factor Solution.

Component Matrix[a]

	Component				
	1	2	3	4	5
q0023_0001	.727				
q0029_0001	.717				
q0021_0001	.694				
q0027_0001	.685				
q0020_0001	.670		-.512		
q0002_0001	.667		-.406		
q0025_0001	.663		.420		
q0028_0001	.663				
q0011_0001	.659				
q0006_0001	.657				
q0009_0001	.647		.418		
q0005_0001	.643			.435	
q0022_0001	.631		-.428		
q0008_0001	.628				
q0024_0001	.615		.435		
q0007_0001	.585	-.402	.465		
q0001_0001	.572		-.533		
q0010_0001	.557	.426			
q0003_0001	.499		-.404	.498	
q0015_0001	.401	.624			
q0013_0001		.603			
q0019_0001	.534	.597			
q0017_0001	.514	.588			
q0014_0001		.585			
q0016_0001	.432	.577			
q0026_0001	.492	.548			
q0004_0001	.476	.542			
q0018_0001	.501	.536			
q0012_0001		.522			

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

Table 14: Rotated Component Matrix for Five-Factor Solution.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
q0007_0001	.883				
q0025_0001	.852				
q0024_0001	.818				
q0009_0001	.769				
q0006_0001	.747				
q0011_0001	.680				
q0005_0001	.658				
q0029_0001	.628				.490
q0001_0001		.827			
q0003_0001		.798			
q0020_0001		.759			
q0002_0001		.693			
q0023_0001		.690			
q0010_0001		.451	.424	.402	
q0018_0001			.802		
q0012_0001			.792		
q0017_0001			.763		
q0019_0001			.723		
q0004_0001			.679		
q0015_0001				.844	
q0014_0001				.765	
q0013_0001				.704	
q0026_0001				.653	
q0016_0001			.459	.559	
q0008_0001					.679
q0027_0001	.517				.644
q0021_0001		.499			.634
q0028_0001					.634
q0022_0001		.547			.611

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 8 iterations.

Table 15 shows the survey items (variables) loading onto each of the factors retained in the five-factor solution.

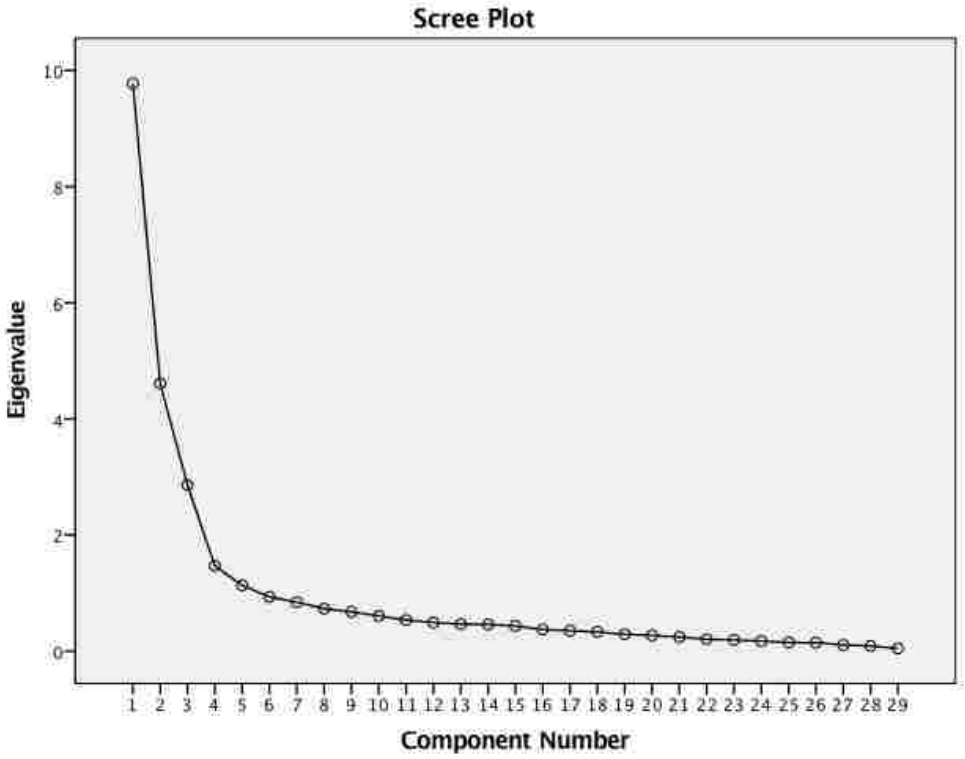
Table 15: Five-Factor Solution Loadings.

Factor 1 (λ=9.779; 33.720% of total variance)		
Item	Question	Loading
5	I am able to concentrate at work.	.658
6	I feel that I accomplish a lot of work at my job.	.747
7	I provide a high level of work quality.	.883
9	I take initiative at work.	.769
11	I understand my work goals.	.680
24	I efficiently perform my work tasks.	.818
25	I think that I am productive at work.	.852
29	I am able to contribute to my organization's goals.	.628
Factor 2 (λ=4.609; 15.894% of total variance)		
Item	Question	Loading
1	Our organization utilizes resources effectively.	.827
2	Our organization is effective in achieving its goals.	.693
3	Our organization addresses problems that limit productivity.	.798
20	Our organizational processes enable productivity.	.759
23	Conditions in my job allow me to be about as productive as I could be.	.690
Factor 3 (λ=2.86; 9.863% of total variance)		
Item	Question	Loading
4	Around here, it often takes more effort than it should to complete a task.	.679
12	Uncertainty in my job makes it difficult to complete tasks assigned to me.	.792
17	My productivity is often hindered by lack of managerial direction.	.763
18	My productivity is often hindered by lack of managerial support.	.802
19	I often feel frustrated while trying to meet work goals.	.723
Factor 4 (λ=1.47; 5.070% of total variance)		
Item	Question	Loading
13	I am often unproductive due to random noise.	.704
14	I am often unproductive due to interruptions.	.765
15	I am often unproductive due to lack of privacy.	.844
16	My productivity is often hindered by lack of flexibility.	.559
26	My office environment reduces my productivity at work.	.653
Factor 5 (λ=1.13; 3.907% of total variance)		
Item	Question	Loading
8	I feel creative at work.	.679
21	Our organizational processes enable learning.	.634
22	Our organizational processes enable innovation.	.611
27	I feel motivated at work.	.644
28	My job responsibilities allow me to make good use of my skills and abilities.	.634

Retaining factors with $\lambda > 1.0$ is only one indicator of solid factors in principle component analysis. Even though all five factors extracted have eigenvalues above 1.0, Factor 3 ($\lambda = 2.86$) has almost twice a higher score than Factor 4 ($\lambda = 1.47$). The scree plot for the five-factor solution (Figure 5) shows the graph becoming flatter and leveling

off at Factor 4 and beyond, because the factors account for much less variance in the sample.

Figure 5. Scree Plot for Five-Factor Solution.



Item 10 was the only component to not load to a factor with a score of .512 or greater, and in addition, it loaded onto three factors. After it was removed, the five factors explained 69.083% of the variance, a marginal improvement.

When glancing back at the variables loading to each factor (Table 12), it looks as if Factor 4 and Factor 5 have legitimate themes, but there seems to be room for refinement in future research to improve their structure, as there are several cross-

loadings, fewer variables with adequate loadings, lower eigenvalues than the other factors, and less variance explained. Omitting Factors 4 and 5, the first three factors alone accounted for 59.477% of the variance for this initial run. Items 8, 13, 14, 15, 16, 21, 22, 26, 27, and 28 were then removed due to less ideal loadings (less than .40; Field, 2009). In a different sample or under different analysis conditions, as well as with different research goals, the factors would likely be more salient.

Recall that the primary goal of EFA was pragmatic, meaning that data reduction was a primary goal (although meaning can still be interpreted for the factors) (Conway & Huffcutt, 2003). The PCA was run again while fixing the number of factors to three. The descriptive statistics table showing the items belonging to the factors, their mean scores, and standard deviations is shown in Table 16.

Table 16: Descriptive Statistics for Three-Factor Solution.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
q0001_0001	4.7900	1.62863	100
q0002_0001	5.2100	1.45154	100
q0003_0001	4.4300	1.68927	100
q0004_0001	3.4300	1.73645	100
q0005_0001	5.5700	1.21651	100
q0006_0001	5.7900	1.13969	100
q0007_0001	6.0700	.98734	100
q0009_0001	6.1000	1.04929	100
q0011_0001	6.0600	1.00323	100
q0012_0001	4.3400	1.81587	100
q0017_0001	4.5100	1.87754	100
q0018_0001	4.4200	2.01098	100
q0019_0001	4.1200	1.77684	100
q0020_0001	4.2100	1.73668	100
q0023_0001	4.3900	1.80848	100
q0024_0001	5.7200	1.23975	100
q0025_0001	5.8000	1.19764	100
q0029_0001	5.8000	1.19764	100

The KMO statistic improved slightly in the three-factor PCA solution, from 0.840 in the five-factor solution to now 0.860 in the three-factor solution, as shown in Table 17.

Table 17: KMO and Bartlett's Test for Three-Factor Solution.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.860
Bartlett's Test of Sphericity	Approx. Chi-Square	1159.699
	df	153
	Sig.	.000

The Bartlett's test significance ($p < .001$) indicated that the correlation matrix is not an identity matrix, which can also be verified by looking at the correlation matrix. The Kaiser-Meyer-Olking (KMO) statistic for assessment of sampling adequacy is well above 0.600, which is desirable. The results of the tests performed in Table 17 indicate that factor analysis can be performed on the dataset.

The communalities represent the proportion of common variance present in a variable (Field, 2009) and were assessed to support the decision to operationalize perceived productivity as a valid construct. The communalities (Table 18) observed in the three-factor solution are all above .40 (Costello & Osborne, 2005)

Table 18: Communalities for the Three-Factor Solution.

Communalities

	Initial	Extraction
q0001_0001	1.000	.792
q0002_0001	1.000	.672
q0003_0001	1.000	.662
q0004_0001	1.000	.607
q0005_0001	1.000	.522
q0006_0001	1.000	.628
q0007_0001	1.000	.759
q0009_0001	1.000	.692
q0011_0001	1.000	.604
q0012_0001	1.000	.620
q0017_0001	1.000	.705
q0018_0001	1.000	.706
q0019_0001	1.000	.698
q0020_0001	1.000	.642
q0023_0001	1.000	.687
q0024_0001	1.000	.702
q0025_0001	1.000	.765
q0029_0001	1.000	.594

Extraction Method: Principal Component Analysis.

Recall that the goal in factor analysis is to retain the least amount of factors that explain most of the variance (Meyers, Gamst, & Guarino, 2013). Table 19 shows that 66.988% of the variance in the items can be explained by the three extracted components. The scree plot for the three-factor solution (Figure 6) also shows that little value is explained from Factor 4 and beyond.

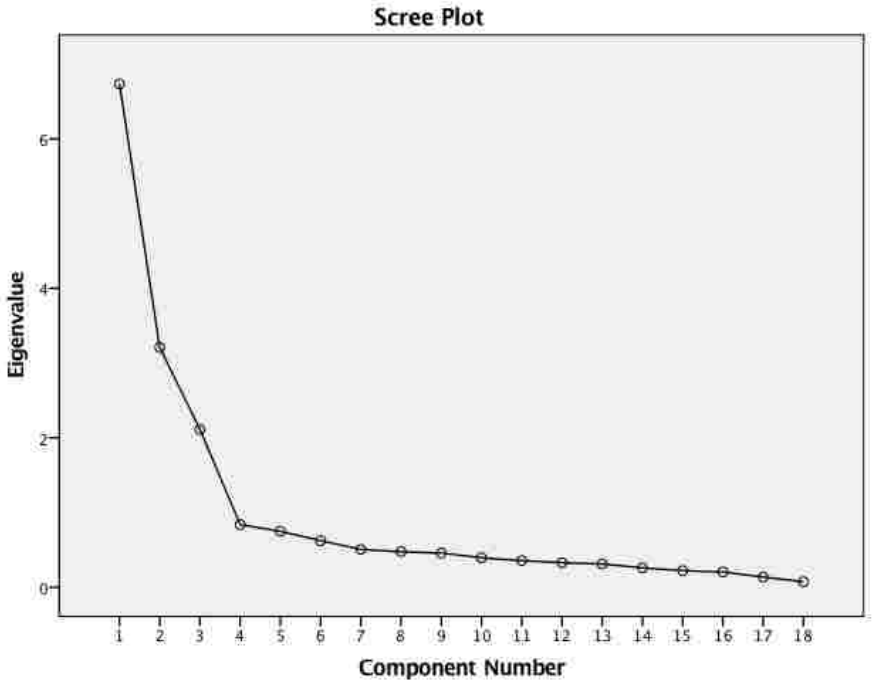
Table 19: Total Variance Explained for Three-Factor Solution.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.734	37.412	37.412	6.734	37.412	37.412	5.216	28.978	28.978
2	3.211	17.841	55.253	3.211	17.841	55.253	3.552	19.733	48.711
3	2.112	11.735	66.988	2.112	11.735	66.988	3.290	18.277	66.988
4	.840	4.665	71.654						
5	.748	4.156	75.809						
6	.624	3.468	79.277						
7	.506	2.812	82.090						
8	.475	2.640	84.729						
9	.458	2.543	87.273						
10	.396	2.200	89.472						
11	.357	1.983	91.456						
12	.329	1.826	93.282						
13	.312	1.734	95.016						
14	.259	1.441	96.457						
15	.223	1.239	97.696						
16	.204	1.132	98.828						
17	.136	.757	99.585						
18	.075	.415	100.000						

Extraction Method: Principal Component Analysis.

Figure 6. Scree Plot for Three-Factor Solution.



The scree plot represents the information about component eigenvalues from the previous table in a graphical form.

The component matrix (Table 20) and the rotated component matrix (Table 21) from the PCA are provided. Positive factor loadings equal to or above .512 (for a sample size of 100) indicate that the variables positively correlate with the underlying dimension extracted to an extent that should be interpreted (Field, 2009).

Table 20: Component Matrix for Three-Factor Solution.

Component Matrix[a]

	Component		
	1	2	3
q0025_0001	.749	-.426	
q0029_0001	.737		
q0006_0001	.733		
q0011_0001	.705		
q0007_0001	.696	-.472	
q0024_0001	.693	-.450	
q0009_0001	.690	-.423	
q0005_0001	.686		
q0023_0001	.683		
q0002_0001	.643		-.461
q0020_0001	.635		-.406
q0004_0001		.679	
q0018_0001	.425	.641	
q0019_0001	.424	.624	
q0017_0001	.422	.598	.411
q0001_0001	.596		-.606
q0003_0001	.529		-.586
q0012_0001		.457	.563

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Table 21: Rotated Component Matrix for Three-Factor Solution.

Rotated Component Matrix[a]

	Component		
	1	2	3
q0007_0001	.871		
q0025_0001	.863		
q0024_0001	.831		
q0009_0001	.828		
q0006_0001	.757		
q0011_0001	.751		
q0029_0001	.712		
q0005_0001	.670		
q0001_0001		.877	
q0003_0001		.803	
q0002_0001		.773	
q0020_0001		.745	
q0023_0001		.736	
q0017_0001			.827
q0018_0001			.819
q0019_0001			.818
q0012_0001			.766
q0004_0001			.694

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

The component transformation matrix (Table 22) shows that orthogonal rotation was performed by SPSS. The complete correlation matrix is shown in Appendix G.

Table 22: Component Transformation Matrix for Three-Factor Solution.

Component Transformation Matrix

Component	1	2	3
1	.771	.534	.348
2	-.570	.335	.750
3	.284	-.777	.562

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 23 shows the three factors onto which the survey questions loaded.

Table 23: Three-Factor Solution Loadings.

Factor 1 (λ=6.734; 37.412% of total variance)		
Item	Question	Loading
5	I am able to concentrate at work.	.670
6	I feel that I accomplish a lot of work at my job.	.757
7	I provide a high level of work quality.	.871
9	I take initiative at work.	.828
11	I understand my work goals.	.751
24	I efficiently perform my work tasks.	.831
25	I think that I am productive at work.	.863
29	I am able to contribute to my organization's goals.	.712
Factor 2 (λ=3.211; 17.841% of total variance)		
Item	Question	Loading
1	Our organization utilizes resources effectively.	.877
2	Our organization is effective in achieving its goals.	.773
3	Our organization addresses problems that limit productivity.	.803
20	Our organizational processes enable productivity.	.745
23	Conditions in my job allow me to be about as productive as I could be.	.736
Factor 3 (λ=2.112; 11.735% of total variance)		
Item	Question	Loading
4	Around here, it often takes more effort than it should to complete a task.	.694
12	Uncertainty in my job makes it difficult to complete tasks assigned to me.	.766
17	My productivity is often hindered by lack of managerial direction.	.827
18	My productivity is often hindered by lack of managerial support.	.819
19	I often feel frustrated while trying to meet work goals.	.818

The three-factor solution was used to refine the GMPP, and the 18-item instrument was used to operationalize perceived productivity in the main study, to finally begin to examine its relationship with other variables relevant to the research.

GENERAL MEASURE OF PERCEIVED PRODUCTIVITY RELIABILITY AND VALIDITY

The average loadings for all three factors of perceived productivity are above .78. The first factor, *individual productivity,* had an average factor loading of 0.7854. The second

factor, *organizational productivity,* had an average factor loading of 0.7868. The third factor, organizational barriers to productivity, related to *managerial productivity,* had an average factor loading of 0.7848. Internal consistency was computed in SPSS, yielding an internal consistency score of .908 for the three-factor solution containing 18 items (Table 24)

Table 24: Internal Consistency of GMPP

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.908	.914	18

To establish internal convergent and divergent validity, the inter-item correlation table for the three-factor solution (Appendix G) was reviewed. Examples of high and low correlation values within the table are shown in Table 25. Low scores close to 0 demonstrate items with no correlation, as observed in the data, while scores closer to 1 demonstrate items that correlate highly.

Table 25: Examples of Internal Convergent and Divergent Validity Checks

Internal Convergent Validity: Item Pairs with Correlation Values Close to One		
Item 11. My productivity is often hindered by lack of managerial direction.	Item 12. My productivity is often hindered by lack of managerial support.	.844
Item 1. Our organization utilizes resources effectively.	Item 2. Our organization is effective in achieving its goals.	.799
Item 6. I feel that I accomplish a lot of work at my job.	Item 17. I think that I am productive at work.	.743
Internal Divergent Validity: Item Pairs with Correlation Values Close to Zero		
Item 8. I take initiative at work.	Item 13. I often feel frustrated while trying to meet work goals.	.004
Item 8. I take initiative at work.	Item 10. Uncertainty in my job makes it difficult to complete tasks assigned to me.	-.005
Item 7. I provide a high level of work quality.	Item 13. I often feel frustrated while trying to meet work goals.	.016

If items that are expected to correlate show high correlation, the instrument is said to demonstrate internal convergent validity; likewise, if items that are not expected to correlate show low correlation, then the instrument is said to demonstrate internal divergent validity (Campbell & Fiske, 1959; Bagozzi, Yi, & Phillips, 1991). The analysis shows that there is reasonable evidence to justify internal construct validity, for the purposes of this research.

PHASE 2 RESULTS: INSTRUMENT APPLICATION

The second part of the chapter discusses the main results arising from the deployment of the developed instrument in a main study involving moderated multiple regression analysis. The chapter details the results of the analysis of the data collected in the main survey, which was distributed as an online survey containing three research instruments: the Organizational Climate Scale (CLIOR), the General Measure of Perceived Productivity (GMPP), and the Affective Commitment Scale (ACS).

Research Population and Sample. SurveyMonkey.com recruited 216 participants to take part in the main survey. The completion rate was 94.9%. The demographics represent even distribution among females and males (Figure 7), age ranges (Figure 8), and private and public sector employees (Figure 9). The length of employment for majority of participants was less than 5 years (39.4%), as shown in Figure 10, however this could be related to a number of factors, for example, economic recession, career advancement, or family life changes.

Figure 7: Distribution of Males and Females in Main Survey Population.

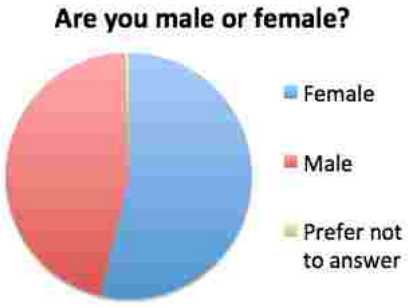


Figure 8: Distribution of Age Ranges in Main Survey Population.

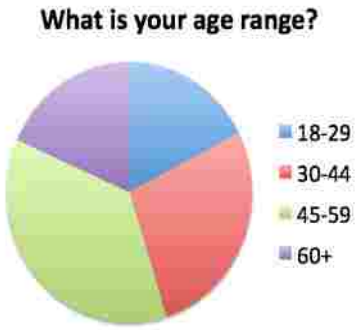


Figure 9: Distribution of Private and Public Sector Employees in Main Survey Population.

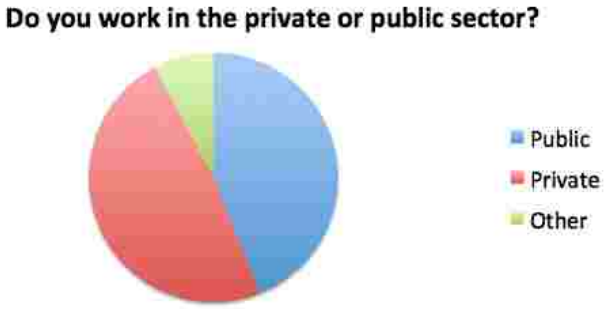


Figure 10: Distribution of Current Employment Experience in Main Survey Population.

The data collected in the survey by participants responding to the research instruments selected to operationalize the research variables allowed exploration of the theoretical framework presented in Chapter 1.

Normality of the data. Although normality of the data is not necessarily required for regression with a sufficient sample size (Williams, Gómez Grajales, & Kurkiewicz, 2013; Ghasemi & Zahediasl, 2012), the data does demonstrate in many different ways (as detailed throughout the chapter) that it is suitable for the techniques applied in the analysis. Regardless, tests for normality were performed on the data that included calculation of normality statistic and visualization of data distribution. Composite scores for the measured research variables are shown in Table 26.

Table 26: Normality Statistics for Main Survey Data.

Statistics

		OC	PP	AC
N	Valid	216	210	206
	Missing	0	6	10
Mean		3.7295525	5.2304762	4.4084
Std. Error of Mean		.05104421	.06734531	.09243
Median		3.8333333	5.2666667	4.3750
Mode		4.00000	5.26667[a]	4.00
Std. Deviation		.75019367	.97592622	1.32657
Variance		.563	.952	1.760
Skewness		-.428	-.454	-.198
Std. Error of Skewness		.166	.168	.169
Kurtosis		-.006	.116	-.509
Std. Error of Kurtosis		.330	.334	.337
Range		4.00000	5.20000	5.50
Minimum		1.00000	1.80000	1.50
Maximum		5.00000	7.00000	7.00
Sum		805.58333	1098.40000	908.13

a. Multiple modes exist. The smallest value is shown

Values close to zero for skewness and kurtosis indicate that data is normally distributed (Field, 2009).

For samples above 200, Field (2009) explains that it is more important to observe the shape of the distribution visually than to calculate z-scores. The histograms are provided in Appendix H. The shapes of the bell curves for the variables appear to be close to the normal distribution.

CONFIRMATORY FACTOR ANALYSIS

Data collected in the main survey was used to further refine the instruments selected for the research prior to addressing the second research question. Table 27 shows the component matrix from the Organizational Climate Scale participant data:

Table 27: Component Matrix for Organizational Climate Scale in Main Survey.

Component Matrix[a]

	Component
	1
OC1	.741
OC2	.816
OC3	.799
OC4	.607
OC5	.681
OC6	.728
OC7	.822
OC8	.707
OC9	.780
OC10	.823
OC11	.703
OC12	.586
OC13	.101
OC14	.357
OC15	.099

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

It was not surprising that the last three items scored lower than the rest, as the instrument items were worded negatively, did not positively correlate with the underlying construct, and were reverse-coded in the analysis. It is not unusual for reserve-coded items to produce unexpected factor structures in factor analysis (Netemeyer, Bearden, & Sharma, 2003). This can often be the result of miscomprehension due to negation (Swain,

Weathers, & Niedrich, 2008). Although the instrument scored highly in reliability and validity in the original development (Peña-Suárez et al., 2013), items 13, 14, and 15 were lower-scoring items in the analysis of the research dataset and, therefore, were omitted in the analysis. A resulting component matrix is shown in Table 28:

Table 28: Component Matrix for Revised Organizational Climate Scale.

Component Matrix[a]

	Component
	1
OC1	.741
OC2	.815
OC3	.803
OC4	.606
OC5	.686
OC6	.725
OC7	.823
OC8	.708
OC9	.784
OC10	.827
OC11	.702
OC12	.586

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

It was also not surprising that revisions would be made to the items included in the GMPP. Here is the component matrix of the survey items (Table 29):

Table 29: Component Matrix for General Measure of Perceived Productivity in Main Survey.

Component Matrix[a]

	Component
	1
PP1	.768
PP2	.789
PP3	.762
PP4	.389
PP5	.572
PP6	.709
PP7	.624
PP8	.605
PP9	.694
PP10	.329
PP11	.537
PP12	.534
PP13	.418
PP14	.717
PP15	.734
PP16	.692
PP17	.700
PP18	.828

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Items 4 and 10 were excluded from the analysis because of slightly less desirable loading (.40 or higher is preferred; Field, 2009). Interestingly enough, after removing the item and conducting the analysis again, item 13 was determined to be below .40 (Table 30):

Table 30: Component Matrix for GMPP (First Iteration)

Component Matrix[a]

	Component
	1
PP1	.761
PP2	.790
PP3	.753
PP5	.582
PP6	.725
PP7	.655
PP8	.638
PP9	.715
PP11	.491
PP12	.488
PP13	.374
PP14	.712
PP15	.733
PP16	.713
PP17	.724
PP18	.828

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

After removing item 13 because of its slightly lower loading, the following component matrix (Table 31) emerged:

Table 31: Component Matrix for GMPP (Second Iteration).

Component Matrix[a]

	Component
	1
PP1	.754
PP2	.786
PP3	.747
PP5	.585
PP6	.733
PP7	.670
PP8	.654
PP9	.726
PP11	.465
PP12	.460
PP14	.708
PP15	.731
PP16	.726
PP17	.737
PP18	.823

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

With all of the items now loading well over .40, the items from Table 31 were included in the moderated multiple regression analysis detailed in the next section. Note that the all of the main study data for the well-established Affective Commitment Scale (ACS) had high loadings and therefore no adjustments were made to the retained items (Table 32):

Table 32: Component Matrix for Affective Commitment Scale in Main Study.

Component Matrix[a]

	Component
	1
ACS1	.764
ACS2	.723
ACS3	.623
ACS4	.547
ACS5	.743
ACS6	.845
ACS7	.811
ACS8	.832

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

The main survey data taking into account the omitted survey items were used for the moderated multiple regression analysis detailed in the next section.

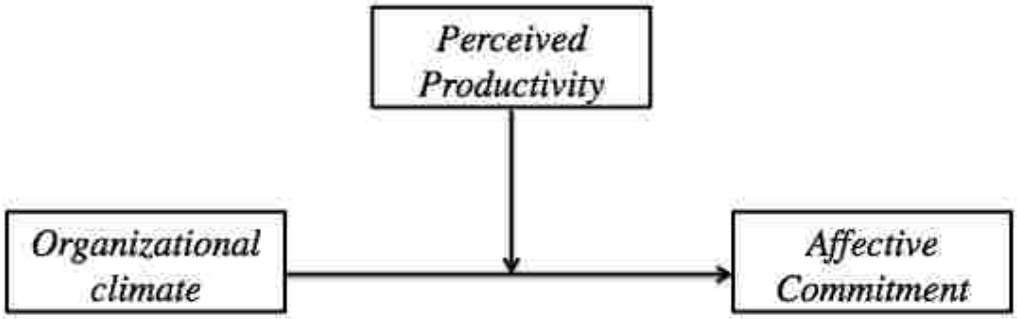
MODERATED MULTIPLE REGRESSION

The second research question asked: *does perceived productivity moderate the relationship between organizational climate and affective commitment? If not, to what extent do relationships exist between these variables?* In the proposed research model, perceived productivity is explored as a potential moderator variable. A moderator variable *M* is one that directly influences the relationship between two other variables: if *M* affects the strength of the relationship between *X* and *Y*, then *M* is a *moderating* variable. A moderator, or interacting variable, affects the strength or the direction between two variables, and can explain when the effect occurs (Baron & Kenny, 1986).

The moderation construct was adopted in this research; however, further discussion is provided in Appendix I on the differences between moderation and mediation and how mediation could be used in further research in this area.

The theoretical framework proposed in Chapter 1 shows the following hypothesized moderating effect of perceived productivity on the relationship between organizational climate and perceived productivity (Figure 11):

Figure 11: Researcher's Theoretical Framework.



In the model, the independent variable, organizational climate, is related to affective commitment, which has also been demonstrated in previous research (e.g. Kuenzi, 2008). Perceived productivity is introduced as a hypothesized moderator variable, suggesting that the relationship between the independent variable and dependent variable is strengthened with the presence of perceived productivity. This research employed statistical techniques on the dataset to test the hypothesis that perceived productivity is a moderator variable.

In the event that the difference between the conditional effects of organizational climate on affective commitment is equal to zero (i.e. the relationship between organizational climate and affective commitment are the same under varying amounts of perceived productivity, as articulated in the null hypothesis), the research would not be able to show the moderating effect of perceived productivity on the relationship between organizational climate and affective commitment.

The analysis in SPSS begins with an output detailing the descriptive statistics (Table 33) and the variables entered (Table 34).

Table 33: Descriptive Statistics.

	Mean	Std. Deviation	N
AC	.0000000	1.00000000	206
OC	.0091042	.98588264	206
PP	-.0112256	1.00078374	206
OCxPP	.7595	1.40068	206

Table 34: Variables Entered.

Model	Variables Entered	Variables Removed	Method
1	PP, OC[b]	.	Enter
2	OCxPP[b]	.	Enter

a. Dependent Variable: AC

b. All requested variables entered.

Perceived Productivity as a Moderating Variable. To answer the second research question, the data analysis examined the possible moderating influence of

perceived productivity on the relationship between organizational climate and affective commitment. To test perceived productivity as a moderating variable, a multiple regression model with interactions was implemented. In the moderated model, the interaction effect is estimated by including a term that is the cross product of the moderator and independent variable, to detect separately the effects of the independent variable and the cross product on the dependent variable (Echambadi & Hess, 2007).

An initial collinearity investigation begins by glancing at the correlation for variables positively correlations that are close to 1.0 (Table 35).

Table 35: Correlations Among Variables.

Correlations

		AC	OC	PP	OCxPP
Pearson Correlation	AC	1.000	.651	.567	.001
	OC	.651	1.000	.774	-.218
	PP	.567	.774	1.000	-.295
	OCxPP	.001	-.218	-.295	1.000
Sig. (1-tailed)	AC	.	.000	.000	.494
	OC	.000	.	.000	.001
	PP	.000	.000	.	.000
	OCxPP	.494	.001	.000	.
N	AC	206	206	206	206
	OC	206	206	206	206
	PP	206	206	206	206
	OCxPP	206	206	206	206

In Table 30, the correlations among the research model's variables shown are slightly above .50, meaning that it is possible that collinearity could have a slight effect on the model and could cause the true relationships among the variables to be underestimated (Pierce et al., 1998). The three variables (organizational climate, perceived productivity,

and affective commitment) are supposed to be distinct constructs, so they should not correlate too highly, to avoid collinearity issues that would produce error in estimating the regression coefficients. To be safe, the VIF and tolerance scores (collinearity statistics) were assessed in the moderated multiple regression model.

Table 36 shows the results of the analysis of variance (ANOVA).

Table 36: ANOVA.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	88.830	2	44.415	77.612	.000[b]
	Residual	116.170	203	.572		
	Total	205.000	205			
2	Regression	94.794	3	31.598	57.917	.000[c]
	Residual	110.206	202	.546		
	Total	205.000	205			

a. Dependent Variable: AC

b. Predictors: (Constant), PP, OC

c. Predictors: (Constant), PP, OC, OCxPP

In Table 36, the coefficients for the model that become inputs for Model 1 and Model 2 are shown. Note the significance of the p-values for the *B*-values in Model 2, and how perceived productivity becomes significant ($p < .05$) in Model 2. Collinearity statistics are also provided in Table 37.

Table 37: Coefficients for the Moderated Regression Model.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-.003	.053		-.059	.953	-.107	.101					
	OC	.535	.085	.528	6.329	.000	.368	.702	.651	.406	.334	.402	2.490
	PP	.159	.083	.159	1.905	.058	-.006	.323	.567	.132	.101	.402	2.490
2	(Constant)	-.099	.059		-1.678	.095	-.216	.017					
	OC	.530	.083	.523	6.423	.000	.368	.693	.651	.412	.331	.401	2.491
	PP	.215	.083	.215	2.587	.010	.051	.379	.567	.179	.133	.385	2.599
	OCxPP	.127	.039	.179	3.306	.001	.051	.204	.001	.227	.171	.913	1.096

a. Dependent Variable: AC

The VIF values are below 4.0, and tolerance levels are above 0.25 (all are above 0.385), which are acceptable, indicating that excessive variance is not shared among independent variables.

The coefficient *B* value of 0.535 reflects the unstandardized slope for organizational climate, meaning that the model predicts an increase of 0.535 for every one unit of change in organizational climate. The significance of the value ($p < .001$) for organizational climate shows that the value is significantly different than 0. The lesser significance of perceived productivity in Model 1 ($p = 0.58$) indicates that perceived productivity is not statistically significant in its relationship to affective commitment, when taking organizational climate into account.

In Model 2, the perceived productivity variable (previously not statistically significant, $p = .058$) becomes statistically significant ($p = .01$). The moderation term is significant ($p = .001$). This demonstrates that organizational climate is related to affective commitment under certain moderating circumstances of varying levels of perceived

productivity. The moderation effect of perceived productivity seems clear, although other indicators are discussed in the rest of the chapter for confirmation.

To test the hypothesis of whether perceived productivity moderates the relationship between organizational climate and affective commitment, moderated multiple regression analysis was conducted. Two predictor variables were included in the first model: organizational climate and perceived productivity. The interaction variable was introduced in the second model. Recall that the test of the moderating effect involves the statistical comparison of the additive (Model 1) and moderator models (Model 2):

$$Y = b_0 + b_1 X + b_2 M + e \qquad (1)$$

$$Y = b_0 + b_1 X + b_2 M + b_3 X \times M + e \qquad (2)$$

The statistical comparison can be conducted by observing the moderated regression model summary output from SPSS (Table 38).

Table 38: Moderated Regression Model Summary.

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.658[a]	.433	.428	.75648326	.433	77.612	2	203	.000	
2	.680[b]	.462	.454	.73862869	.029	10.933	1	202	.001	2.243

a. Predictors: (Constant), PP, OC

b. Predictors: (Constant), PP, OC, OCxPP

c. Dependent Variable: AC

In Table 38, the changes in r-square (R^2) values from Model 1 and Model 2, which represent the amount of variance of a dependent variable in the multiple regression model that is explained by a combination of all of the independent variables, are shown. The R^2 value for Model 2 shows that 45.4% of the variation in the dependent variable can be explained by the model, as opposed to 42.8% of the variation in the dependent variable that is explained in Model 1. When the moderator term is introduced, 2.9% more of the variation is explained.

In Model 1, variables accounted for a significant amount of variance in affective commitment, $R^2 = .433$, $F(2, 203) = 77.612$, $p < .001$. An interaction term between organizational climate and perceived productivity was created to mitigate the possibility of problematic high multicollinearity (Aiken & West, 1991). Now, looking at the changes in r-square values, when the interaction term was added in Model 2, it accounted for a significant proportion of the variance in affective commitment, $\Delta R^2 = .029$, $\Delta F(1, 202) = 10.933$, $p = .00112430$ ($p < .0012$).

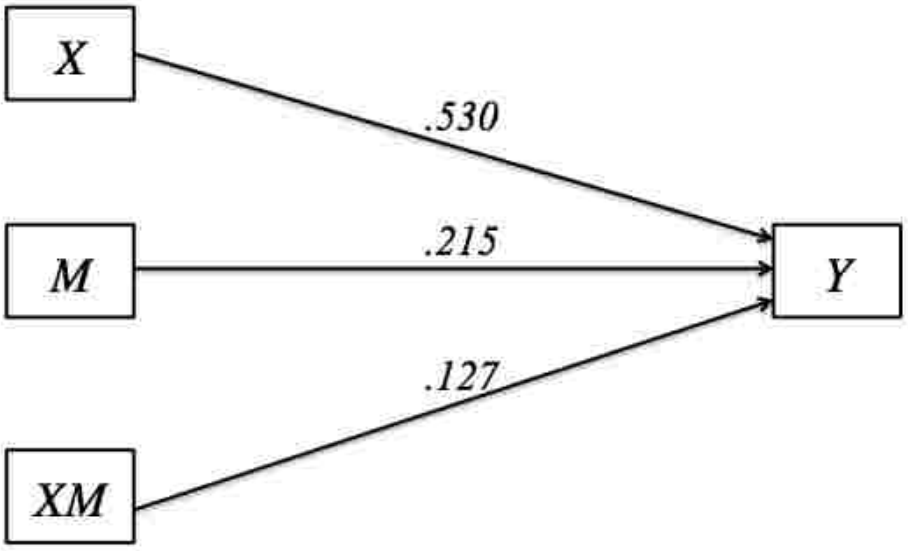
Inputting the *b* values from the results,

$$Y = .535\,X + e \qquad (1)$$

$$Y = .530\,X + .215\,M + .127\,X{\times}M + e \qquad (2)$$

In Figure 12, the values from model (2) are shown in the simple moderation diagram adapted from Hayes (2013):

Figure 12: Simple Moderation Model with Values from Analysis.



The confidence interval for the coefficient *b* values in Model 2 is shown in Table 39:

Table 39: Confidence Intervals for Moderation Model Coefficient Values

Variable	95% Confidence Interval
Organizational Climate (*X*)	.368 < *X* < .693
Perceived Productivity (*M*)	.051 < *Y* < .379
Interaction (*X*×*M*)	.051 < *X*×*M* < .204

Whisman and McClelland (2005) highlighted the unique challenges of reporting standardized regression coefficients in moderator models and instead suggested that only raw regression weights be reported. This is reasonable advice, especially given the

exploratory nature of the research. Regardless, the standardized equations inputting the beta-values approximated in the analysis are:

$$Y = .528\,X + .159\,M \quad (1)$$

$$Y = .523\,X + .215\,M + .179\,X{\times}M \quad (2)$$

SPSS Process Macro Analysis. The R^2 increase in the moderation analysis shows the effect of moderation interaction beyond the main effects, which is significant at $p = .001$ ($p < .01$). In addition, the interaction term in the coefficients table was significant at $p = .001$ ($p < 01$). Due to the suggested significance of the interaction term, the results were further analyzed using mean-centered terms to examine the effect in the PROCESS by Andrew F. Hayes add-on in SPSS (full output in Appendix J). The code conducts an inferential test where:

H_0 = the difference between conditional effects of X is equal to zero;

H_a = the difference between conditional effects of X is different from zero.

Table 40 shows a portion of the output from Andrew F. Hayes' PROCESS add-on for visualizing the conditional effect of X on Y given different levels of the moderator variable M, at the mean, as well as at one standard deviation above and below. The visualization allows for probing the interaction effect of the moderator variable (Hayes, 2012).

Table 40: Conditional Effect of Organizational Climate on Affective Commitment.

	Organizational Climate (OC)		
Perceived Productivity (PP)	**1 SD Below**	**Mean**	**1 SD Above**
1 SD Below	-0.7089	-0.6184	-0.5279
Mean	-0.3132	-0.0968	0.1195
1 SD Above	0.0826	0.4247	0.7668
	Negative OC	**Neutral OC**	**Positive OC**
Low PP	-0.7089	-0.6184	-0.5279
Average PP	-0.3132	-0.0968	0.1195
High PP	0.0826	0.4247	0.7668

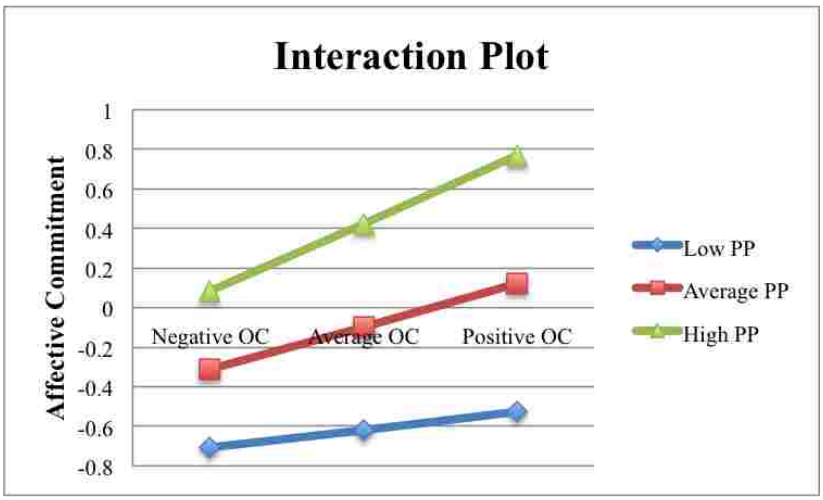
Inputting the values from Table 34 into the classic point-slope equation, using -1, 0 (equal to the mean), and 1 standard deviation above and below mean-centered X and M values and the given values for Y at various levels of M, the following slopes result for each level of perceived productivity (low, average, and high) (Table 36):

Table 41: Strength of X-Y Relationship at Various Levels of M.

Perceived Productivity Level	Strength of Relationship between Organizational Climate and Affective Commitment
Low	.0905
Medium	.2164
High	.3421

Examination of the interaction plot in Figure 13 generated from values in Table 41 shows an enhancing effect that depicts that, as organizational climate and perceived productivity increased, affective commitment increased.

Figure 13: Interaction Plot.



The graph in Figure 12 provides a more meaningful representation of the overall pattern between the variables observed in the data, showing that the independent variable effect observed in the analysis was not constant.

Johnson-Neyman analysis. An alternative approach for probing the interaction effect is the Johnson-Neyman technique, in which the value of M is determined where the interaction effect on the link between X and Y becomes significant. The PROCESS add-on output with the Johnson-Neyman setting selected provided a table with the percent of cases in the data with values of the moderator above and below the points of transition in significance (Hayes, 2012). The Johnson-Neyman technique calculated the region of significance in the data, showing that 3.3981% of the cases had a value below -1.8368, and 96.6019% had a value of the moderator above -1.8368. The range that the

moderator's effect is significantly positive is when the standardized value of perceived productivity is above -1.8368.

In conclusion, based on the results of the moderated multiple regression analysis and the advanced analysis techniques, the null hypothesis is rejected, and the alternative hypothesis is accepted: the difference between conditional effects of organizational climate measured at the individual unit of analysis on the same individual's self-assessed affective commitment at different levels of the moderator, perceived productivity, is different from zero. There was a positive relationship between organizational climate and affective commitment that is strengthened with the influence of the identified moderator. As such, the strength of the relationship between organizational climate and affective commitment was shown to depend upon perceived productivity levels, such that the relationship is strongest when perceived productivity is high and weakest when perceived productivity is low.

CHAPTER 5

CONCLUSIONS, DISCUSSION, AND SUGGESTIONS FOR FUTURE RESEARCH

The chapter asserts the research findings arising from the instrument development process and testing of the proposed integrated moderation model. A summary of the research study is provided, followed by a discussion of the research findings, interpretations, and conclusions. Some implications are provided for implementation in practice.

The greatest success of this dissertation was the development of an instrument capable of operationalizing an unexplored variable of interest: perceived productivity. The introduction of the variable and its inclusion in a moderation model of organizational climate and affective commitment facilitated considerable insight about the nature of perceived productivity and its legitimate place in organizational research. One goal of the research was to develop a stream of research on perceived productivity. Some limitations arising in the research are discussed, followed by suggestions for many different possible directions for future research. This final chapter concludes with several avenues for that effort.

SUMMARY OF THE STUDY

This section reviews the research questions, summarizes the results of the approach taken, and addresses the successes of the research study.

The first research question asked *what instrument could be developed to operationalize perceived productivity, to obtain a general measure?* The exploratory factor analysis produced an instrument capable of assessing a perceived productivity construct. The instrument demonstrated validity and reliability and, in the main analysis, demonstrated its independence as a distinct and measurable variable. Further refinement of the instrument was conducted subsequently using confirmatory factor analysis, showing promising results for future exploration of the perceived productivity construct.

The second research question asked *does perceived productivity moderate the relationship between organizational climate and affective commitment? If not, to what extent do relationships exist between these variables?* The second phase of research operationalized perceived productivity as a moderator variable to explore the question.

DISCUSSION OF FINDINGS

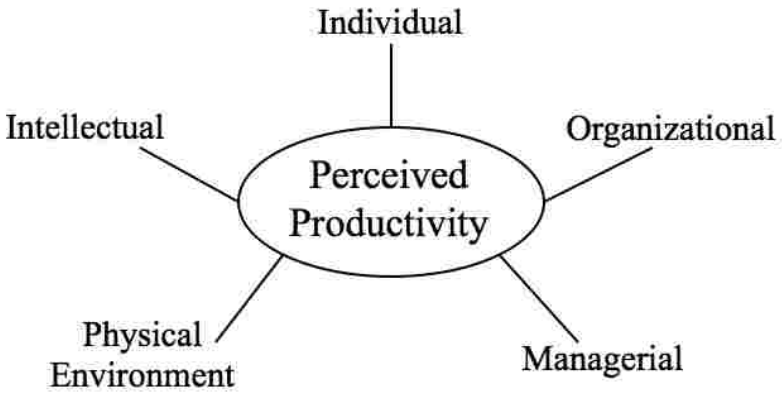
This section discusses the findings of the instrument development and the application of the instrument. The findings demonstrate not only that perceived productivity exists as a distinct and measurable construct, but also that it clearly has an influence on individuals in organizational settings.

General Measure of Perceived Productivity. An indicator of retaining solid, meaningful factors is that a researcher can make theoretical sense of why the items correlate with each other. After factor loadings are obtained and factor rotation improves the distinction of factors, they should be interpreted (Bordens & Abbott, 2011). Effort was made to interpret the nature of each of the retained factors and to provide names for the concepts that the factors appeared to represent. Items loading onto Factor 1 addressed

the individual's perceptions regarding their own *individual productivity.* Items loading onto Factor 2 addressed perceptions regarding the *organizational productivity*. Items loading onto Factor 3 addressed perceptions about organizational barriers to productivity related to *managerial productivity*. Items loading onto Factor 4 addressed perceptions about *physical environment barriers to productivity*. Items loading onto Factor 5 addressed perceptions about *intellectual contributions to productivity.*

Because Factors 3 and 4 have primary negatively worded, reverse-score items, future development on the instrument could supplement them by adding affirmative statements. Factor 3 loaded three items directly related to management issues: "Uncertainty in my job makes it difficult to complete tasks assigned to me (Item 12), "My productivity is often hindered by lack of managerial direction" (Item 17), and "My productivity is often hindered by lack of managerial support" (Item 18). Future inquiry might reveal that Factor 3 is related to management factors of productivity, and that Factor 2 is related to organizational factors of productivity. Additional qualitative inquiry might also result in Factor 4 being more appropriately renamed as "environmental factors of productivity" (Factor 4). The factor themes interpreted in the analysis are provided in Figure 14:

Figure 14: Factors of Perceived Productivity



Because the EFA was conducted as a PCA with data reduction as the goal, Factors 4 and 5 were omitted from the model. In retrospect, Factor 4 may not have been related to organizational climate, because it represented factors in the physical environment such as lack of privacy, random noise, and interruptions. In addition, more questions could be added as there is a lot of productivity literature in the area of designing physical workplaces to enhance productivity (e.g. Haynes, 2009; Mak, 2012; Yang & Zheng, 2011, Wiik, 2011; Clements-Croome & Baizhan, 2000).

Factor 5, which represented the collection of items addressing intellectual factors of creativity, contains items that are less cohesive, in that they describe broad concepts: creativity, innovation, motivation, organizational learning, and agent-job fit. The questions may be improved to better package them as a single factor with higher loadings. The topics could also individually be explored in relation to perceived productivity, as they have considerable interest in the areas of industrial-organizational psychology and entrepreneurship.

Moderation Analysis. Moderated multiple regression analysis supports the hypothesis that perceived productivity has an effect on the relationship between organizational climate and affective commitment. The tests for moderation assume model fidelity. Further insight is gained when begging the question, *why would the effect of organizational climate on affective commitment depend on perceived productivity?* In the statistical tests and in plotting the data, it seems most telling that perceived productivity does strengthen the relationship between organizational climate and affective commitment. However, the findings are also theoretically justifiable.

Previous research has demonstrated that higher levels of employee commitment are observed based on varying attributes related to work climate (e.g. Bahrami et al., 2016; Dorgham, 2012; Lau et al., 2017), so the relationship between organizational climate and affective commitment that was observed in the data did not come as a surprise. The relationship suggests that when an individual perceives his or her organization's policies, practices, procedures, and workplace conditions positively, the individual will feel more committed to and more invested in their organization. For example (to explain the relationship in terms of some example items from the research instruments), if an individual perceives his/her boss(es) to be receptive to contributions and concerns, if goals are clearly defined, and if the necessary resources are available to meet objectives and deadlines, then the same individual is also more likely to become invested in the work that he/she performs, to view shared ownership in the problems of the organization, and to feel a sense of belonging in the workplace. Likewise, if an individual perceives a negative relationship with his/her supervisor, believes that management does not allow shared decision-making, and does not feel that his/her work

is respected, for example, it makes sense that the individual will not feel emotionally attached to the organization and could just as easily find more fulfillment in a new job at a different organization. There is no misunderstanding in the relationship between the two variables; it makes theoretical sense.

However, when the moderator variable, perceived productivity, is taken into account, the strength of the relationship changes. Individuals observing a positive organizational climate will possess higher levels of affective commitment; but the same individuals observing a positive organizational climate will possess *even higher* levels of affective commitment *when* they *also* perceive productivity to be high. Even when individuals perceive a negative organizational climate, their affective commitment level will be higher if they perceive productivity to be higher.

CONCLUSIONS

The research was successful in developing a theory on perceived productivity, an area severely lacking in the organizational and management literature. The GMPP was shown to be an effective instrument for providing a measure of individually perceived productivity, with high reliability and construct validity that is promising for future research in many possible applications.

The results of the moderation analysis demonstrate a clear influence of perceived productivity on the relationship between organizational climate and affective commitment. In a positive organizational climate, affective commitment varies, based on low, average, or high perceived productivity. In general, employees in positive organizational climates with high levels of perceived productivity exhibit the highest levels of affective commitment. In a negative organizational climate, affective

commitment also varies, based on low, average, or high perceived productivity. Employees in negative organizational climates with low perceived productivity exhibit the lowest levels of affective commitment. It is evident in the organizational literature that the greater affective commitment of an employee contributes to positive organizational outcomes.

The findings of the research are beneficial in helping organizations understand how perceptions about policies, procedures, and practices, both informal and formal (otherwise known as organizational climate) are related to affective commitment and how the relationship is also moderated by perceived productivity.

IMPLICATIONS FOR PRACTICE

This research study produced findings that inform the practice of both management professionals and scholars. This section asserts implications from the findings based on links to the specific variables measured and on the demonstrated relationships among them.

This research produced findings that inform both the practice of engineering management and other forms of management. The results indicate the positive influence of perceived productivity on the relationship between organizational climate and affective commitment. From a practical perspective, managers should strive to create an organizational climate that supports perceived productivity. Based on an interpretation of the research results, the following are some suggestions for what can done in organizations and how they can be done:

- Clearly define organizational goals and create a vision of the future that other organizational members can believe in and in which they can choose to invest their energy.
- Clearly define sensible policies that take into account the perspectives of those performing the work.
- Design the work environment, processes, and tasks to support employee productivity, learning, creativity, and innovation.
- Reduce the presence of unnecessary distractions and other barriers to employee productivity.
- Create and utilize effective channels of communication to provide managerial support and direction.
- Listen to concerns and suggestions brought forth by others at all levels and take action when legitimate barriers to productivity are identified.
- Empower employees by encouraging them to take initiative, and build confidence and self-actualization through recognition, socialization, mentoring and development.

Engineering managers and, truly, management in general, could afford to pay more attention to how aspects of their work climate impact their employees' perceptions of productivity. Acquiring insight comes from beyond observing operations and using intuition; a manager should also communicate with his/her direct reports regularly, in order to identify the strengths and weaknesses of current processes and practices. One area for possible future exploration is the area of communication. Loo (2015) advocates

for clear communication of directives and effective monitoring that allows assessment of whether targets are being met and ways to facilitate improvement. Various leader communication strategies could be assessed for change based on how productivity is perceived by the leader's direct reports. Lessons learned during the exchanges of communication can be used to improve, for example, the design of jobs, task-agent fit, communication channels, accessibility of information, reduction of stress, and employee empowerment. All of this can help improve perceive productivity, which has been shown in the research to increase levels of affective commitment, regardless of the current organizational climate. Sense of self and meaning in work arises in perceived productivity, leading to a greater sense of psychological fulfillment in task and project performance.

RESEARCH LIMITATIONS

Limitations identified both during and after the course of the study are discussed in this section. Some issues discovered are related to the complexity of organizational research and to the constructs of interest. Others are related to decision-making and to research design, as well as to limitations in statistical analysis.

Unit of analysis. The research focused on the individual level of analysis of organizational climate, as well as on *perceived* productivity, both subject to the accuracy of the informant interpretations of organizational reality. However, limitations in focusing on perceived (subjective) productivity mitigated some of the measurement concerns related to actual (objective) productivity.

Geographic. Another limitation comes with having only surveyed those in the United States. In other cultures, work climates that are seen as the norm and as positive in those cultures may be viewed negatively if they were evaluated in the U.S. For example, Aboelmaged and El Subbaugh (2012) studied Indian teleworkers and indicated that geographical culture may have an impact on what motivates employees: "In addition to the emergence of job security as a key determinant of perceived teleworking productivity, the role of satisfaction, commitment, work flexibility and management support is also emphasized. Surprisingly, the impact of demographic, attitudes, and technological factors are barely observable." (p. 3)

Inferential statistics. One concern in moderation analysis is that the actual moderator may potentially not be the "true" moderator in the relationship, but instead be a "proxy" moderator; that is, another variable with which the moderator correlates (Little et al., 2007). Future research in various organizational climate dimensions may be insightful to explore that possibility.

Normally in research of this type, limitations are observed regarding collinearity between variables, which may be attributed to the particular instrument selection. This means that there is competition in the two variables for explaining the dependent variable. This phenomenon was not observed in this research. The degree of collinearity depends on correlation between the predictor variables and can be interpreted through VIF and tolerance levels, which were checked in the analysis.

Another major limitation in the moderation models is the susceptibility of chance findings resulting in Type I and Type II errors (MacKinnon, 2011). In addition, the model operates under ordinary least squares (OLS) regression assumptions, including no

measurement error (Cohen et al., 2003). For some findings, inherent risk of these errors could be significant; however, in this research, there appears to be no risk to improving the management and leadership of people. Additional research in other settings and contexts are suggested to confirm findings.

Decision-making. Some difficulty was experienced in selecting the "best" measurement for climate and in navigating the psychological versus organizational climate constructs in a field of literature that is not all in agreement.

SUGGESTIONS FOR FUTURE RESEARCH

This section covers some ideas for future research, both for the refinement of the GMPP instrument as well as for future quantitative studies.

Instrument improvement. GMPP development followed a robust methodology and allowed significant insight in the research study. However, a first generation instrument should be reviewed in future studies for reliability, validity, and applicability. Instrument improvements are needed to build perceived productivity as a theoretically grounded, operationalizable construct. Future research in improving the instrument could include improving its reliability through testing and retesting. External convergent and divergent validity by testing correlations with other instruments could be done, in order to improve overall construct validity. Additional research in this area that is qualitative in nature and takes into account new perspectives to improve the instrument's content validity is also possible.

Psychological climate comparison. The instrument employed in the research was designed to measure organizational climate. Instruments specifically designed to measure psychological climate could also be implemented, for comparative analysis.

Organizational climate versus perceived productivity. Future research focusing on organizational climate and perceived productivity or other outcome variables could utilize the multi-dimensional climate measure proposed by Patterson et al. (2004). This instrument was not selected in the end, due to its breadth and length; it is also not intended to provide a measure of molar climate, but rather a set of measurable organizational climate dimensions. The instrument's authors suggest that to use all of the 17 dimensions in a study "might suggest a lack of theoretical focus" (Patterson et al., 2004, p. 399); however, guided selection from the dimensions would be an excellent choice for future research. The instrument is discussed in Appendix G. Examples for possible future research hypotheses exploring perceived productivity as a mediating variable between organizational climate dimensions and affective commitment are shown in Appendix M.

Perceived productivity versus other forms of commitment. The other two forms of commitment identified in the Meyer and Allen (1991) three-component model are continuance commitment (fear of loss) and normative commitment (sense of obligation to stay). A longitudinal study may detect a shift from these other forms of commitment to affective commitment (affection for one's job) with higher levels of perceived productivity.

Exploration of additional variables. Some initial research questions were omitted involving tests for correlation between the climate dimensions versus job

satisfaction. The research could explore the potential relationships of organizational climate dimensions that demonstrate predictability with respect to job satisfaction, and ways in which the relationship could either be mediated or moderated by perceived productivity. Although some researchers have explored organizational climate and job satisfaction previously, the study offers additional support with a different research design with a different cross-section sample population.

Perceived productivity and job satisfaction have also not been explored. The relationship between organizational climate and job satisfaction has been explored in several theoretical and empirical studies, some indicating at least a moderated relationship (e.g. Downey, Hellriegel, Phelps & Slocum, 1974, Gavin & Howe, 1975; Randhawak & Kaur, 2014; Pratap & Srivasta, 1985) though one found a low correlation (Schneider & Snyder, 1975). Schulte et al. (2006) found that both individual-level climate perceptions and organizational climate are related to job satisfaction. Organizational climate was found to explain 42% of the variation in job satisfaction among salesmen (Churchill, Ford, & Walker, 1976). It was also found to have a greater impact on job satisfaction than did individual level variables (Griffin, 2001). Job satisfaction is the most frequently studied attitudinal variable (Spector, 1997). It is important because dissatisfied workers are likely to quit and look for other jobs, have higher rates of absenteeism, and tend to have lower levels of work performance and more accidents (Churchill, Ford, & Walker, 1976).

Future research could also investigate locus of control or meaning in life (Steger et al., 2006; Daniels, 2012) among other variables of interest in advanced models employing confounding variables, multiple moderators, mediators, moderated mediation,

or mediated moderation. Some examples of other possible psychological variables to explore in mediation and in other models are self-efficacy, job involvement and performance, citizenship behavior, tardiness and absenteeism, turnover intentions, stress, anxiety, and depression. Other organizational outcome variables to explore might be economic performance, consumer satisfaction, and technological innovation.

Unit and organization level of analysis. While the findings indicate that perceived productivity is meaningful as a moderator variable measured on the individual level of analysis, it would be interesting to see if the findings would be consistent at the unit and the organizational level of analysis.

Cross-culture validity and longitudinal research. Perceived productivity could be measured in other cultures and in organizations across the globe to explore its potential influence, based on a number of different psychological, organizational, or culturally situational factors. Many possibilities also exist to explore perceived productivity in longitudinal research, to assess the impact of proactive organizational change.

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APPENDIX A: MEASURES OF ORGANIZATIONAL CLIMATE

Instrument	Dimensions	Items	Population /Focus	Reliability/Validity
Organizational Climate Questionnaire (Litwin & Stringer, 1968)	Structure, responsibility, risk, reward, warmth, support, standards, conflict, identity	50, 9 dimensions; 7 point Likert	Various validation studies	Lacking considerably (Rogers, Miles, and Biggs, 1980) only 5 of the 9 are reliable (Sims and Lafollette, 1975)
Organizational Climate Questionnaire (OCQ) (Furnham & Goodstein, 1997)	Role clarity, respect, communication, reward system, career development, planning and decision making, innovation, relationships, teamwork and support, quality of service, conflict management, commitment and morale, training and learning, and direction.	108 items; 14 dimensions; 7 point Likert on 2 scales (7x7=49)	Employees of an American-owned airline; two separate samples tested 43 managers, 161 non-managers	Agreement scale .60 to .86; mean .77. Importance ratings .70 to .88, mean .78 Weakest scores were teamwork and support
Agency Climate Questionnaire (Schneider & Bartlett, 1968, 1970)	Managerial support, managerial structure, new employee concern, intra-agency conflict, agent independence, general satisfaction	80 items, 6 factors	3500 insurance agents; success defined as continued employment and production	No information available
Organizational Climate Description Questionnaire (Halpin and Croft, 1963)	Disagreement, hindrance, esprit, intimacy, aloofness, production emphasis, trust, and consideration	8 dimensions	Developed for educational settings (teacher and principal behavior and experience)	Some poor loadings in the factors; limited reliability and validity available
Organizational Climate Index (Stern, 1967, 1970),	Intellectual climate, achievement standards, personal dignity, organizational effectiveness, orderliness, impulse control	300 items	Developed to describe university climates	Poor internal reliability and weak validation data (Furnham & Goodstein, 1997)
Survey of Organizations (Bowers & Taylor, 1972),	Technological readiness, human resources primacy, communication flow, motivational conditions, and decision-making practices.	22 items reduced to 13; 5 principal clusters (smallest space analysis)	No information available	Poor internal reliability and weak validation data (Furnham & Goodstein, 1997)
Organizational Climate Questionnaire (Lawler, Hall, & Oldhman, 1974),	Competent, responsible, practical, risk-oriented, impulsive	15 items, 5 dimensions	No information available	No information available
Perceived Organizational Climate (Dieterly & Schneider, 1974),	Individual autonomy, position structure, reward orientation, and consideration	28 items, 4 dimensions	Laboratory study of 120 undergraduate students	Intercorrelations range .64 to .86
Perceived Work Environment (Newman, 1975, 1977)	Supervisory style, task characteristics, performance-reward relationships, coworker relations, employee-work motivation, equipment and arrangement of people and equipment, employee competence, decision making policy, work space, pressure to produce, job	139 items; 11 empirically derived dimensions. Scale 1=yes, 2=?, 3=no; Likert scale 1-5,	5 samples: 1200 total employees from four organizations (regional offices of multiline insurance	Internal consistency: 9 scales above .70, one had .39 and another .55

Psychological Climate Questionnaire (Jones & James, 1979),	Perceived job and role characteristics, leadership style, work group, and sub-system or organization as a whole	145 items; 35 scales in 4 sets	Developed and worded for use with navy personnel	No information available
Organizational Climate Measure (Patterson et al., 2005),	Autonomy, integration, involvement, supervisory support, training, welfare, formalization, tradition, innovation and flexibility, outward focus, reflexivity, clarity of organizational goals, efficiency, effort, performance feedback, pressure to produce, quality	17 latent factor model; 4 quadrants; 95 items, 4 pt Likert scale.	6869 employees of 55 manufacturing organizations	16 of 17 scales with alpha=0.73 or higher, theoretically derived from CVF CFA used only (no EFA)
Survey of Organizational Characteristics (Thumin & Thumin, 2011).	Organizational flexibility, consideration, job satisfaction, structural clarity, future with the organization, organizational honesty, community involvement, reward system	93 items, 8 dimensions.	EFA on MBA students, CFA in hospital setting	.77 to .98, 6 scales above .90
Organizational Climate Scale (CLIOR) Peña-Suárez, et al. (2013)	Work organization, autonomy, participation, cooperation, rewards, relations, attachment to the job, work-life balance, innovation, physical conditions	50 (long) and 15 (short)	1581 for CFA, 1582 for EFA; mean age 51.90 (SD 6.28) all healthcare, 80% female	.94 Cronbach's alpha
House and Rizzo (1972) Organization Description Questionnaire (AKA Organization Practice Questionnaire)	Conflict and inconsistency, decision timeliness, emphasis on analytic method, emphasis on personal development, formalization, goal consensus and clarity, communication adequacy, information distortion and suppression, job pressure, adequacy of planning, smoothness of horizontal communication, selection on ability and performance, tolerance of error, top management receptiveness, upward information requirements, violation in chain of command, work flow coordination, adaptability, adequacy of authority	19 scales; 8 were validated.	Salaried managerial and technical employees in a plant (research and engineering, office). Divided into Sample A=199, Sample B=91 for cross-validation.	Poor internal reliability and weak validation data (Furnham and Goodstein, 1997). Range from .28 to .86
Organizational climate measure (Pritchard & Karasick, 1973)	Autonomy, conflict vs. cooperation, social relations, structure, level of rewards, performance-reward dependency, motivation to achieve, status polarization, flexibility and innovation, decision decentralization, supportiveness	55 questions, 11 dimensions used	76 managers from two firms, one highly achievement motivated, aggressive (franchising; 46); the other conservative and less dynamic (manufacturing; 30).	Range from .66 to .85 (7 of 11 scales above .70)
Survey of Organizations Taylor and Bowers (1972)	Technological readiness, human resources primacy, communications flow, motivational conditions, decision-making practices	22 items	No information available	Poor internal reliability and weak validation data (Furnham and Goodstein, 1997)
Business	Leader's psychological distance,	192 items	120	Poor internal reliability

Organization Climate Index (Payne and Pheysey, 1971) refinement of Stern's (1967)	questioning authority, egalitarianism, management concern for employee involvement, open mindedness, emotional control, physical caution, practical orientation, future orientation, scientific and technical orientation, intellectual orientation, job challenge, task orientation, industriousness, altruism, sociability, Interpersonal aggression, homogeneity, rules orientation, administrative efficiency, conventionality, readiness to innovate, variety in physical environment, orientation to wider community		junior/middle managers from 100 firms	and weak validation data (Furnham and Goodstein, 1997)
Downey, Hellriegel and Slocum (1975)	Decision making, warmth, risk, openness, rewards, and structure	6 dimensions	92 managers from one industrial firm	No information available
Organizational Assessment Survey (U.S. Office of Personnel Management)	Rewards/recognition, training/career development, innovation, customer orientation, leadership and quality, fairness and treatment of others, communication, employment involvement, use of resources, work environment/quality of work life, work and family/personal life, teamwork, job security/commitment to workforce, strategic planning, performance measures, diversity, and supervision.	129 items across 17 dimensions using 5-point Likert's scales, 29 items related to personal experience and satisfaction	Case studies on US Mint and EPA Region VI; also used by many US federal and state employees, though no publicly available data	No information available

APPENDIX B: CONTENT ANALYSIS

Source	Text	Context	Initial code(s) generated	Survey question(s) generated
Robbins and Judge (2007)	An organization is productive if it achieves its goals by transferring inputs to outputs at the lowest possible cost	Organizational	Goal achievement, low output of resources	Our organization utilizes resources efficiently. Around here, it often takes more effort than it should to complete a task (R).
	Productivity implies a concern for both effectiveness (achievement of goals) and efficiency (output to input)	Organizational	Goal achievement, efficiency	Our organization is effective in achieving its goals.
	Subjective measures often aim at defining the outcome in qualitative terms, or at pinpointing the problems in performance	Organizational	Quality of outcomes, situational barriers to performance	Our organization works to correct problems that limit productivity.
Clements-Croome, 2000	"The mind and body need to be in a state of health and well-being for work and concentration. This is a prerequisite for productivity" (p. 4)	Individual (office)	Psychological (input), physiological (input)	I am able to concentrate at work.
Clements-Croome and Kaluarachichi, 2000	"Productivity depends on good concentration, technical competence, effective organization and management, a responsive environment and a good sense of well being" p. 129	Individual (office)	Psychological obstacle, technological competence, organizational/managerial enablement	I have the necessary skills to perform my assigned tasks.
	Self report productivity items on survey: amount of work accomplished, quality of work, feeling creative, taking responsibility	Individual	Quantity of output, quality of output, innovation, initiative	I feel that I accomplish a lot of work at my job. I provide a high level of work quality. I feel creative at work. I take initiative at work.
Schwartz and Kaplan, 2000	While the lack of information can paralyze action, a surfeit of information can prove equally disruptive (p. 243)	Individual (office)	Insufficient information, overabundance of information	Conditions in my job prevent me from being as productive as I could be (R).
	A goal is a necessary condition for mental effort (p. 243)	Individual	Goal alignment	I understand my work goals.
	Uncertainty is one kind of psychological obstacle (p. 243)	Individual	Psychological obstacle	Uncertainty in my job that makes it difficult to complete tasks assigned to me (R).
	Effectiveness and productivity are impacted by extraneous sources of interference (e.g. random noise, interruptions, lack of privacy)	Individual	Social obstacle	I am often unproductive due to random noise, interruptions, or lack of privacy (R).
Aboelmaged & El Subbaugh, 2012	"In addition to the emergence of job security as a key determinant of perceived teleworking productivity, the role of satisfaction, commitment, work flexibility	Individual (Telenetworking)	Flexibility, managerial enablement	My productivity is often hindered by lack of flexibility (R). My productivity is often

	and management support is also emphasized. Surprisingly, the impact of demographic, attitudes and technological factors are barely observable." (p. 3)			hindered by lack of managerial direction or support (R).
Oliveira, Xavier, & Michaloski, 2015	Subjectivity was measured with NASA TLX-Workload, which evaluates the mental, physical, and temporal demands as well as performance, effort, and frustration (p. 198).	Individual (office setting)	Physical, psychological, cognitive, and emotional	I often feel frustrated while trying to meet work goals.
Adler et al. 2009	For more than a century, operations researchers have recognized that organizations can increase efficiency by adhering strictly to proven process templates, thereby rendering operations more stable and predictable (p. 99)	Organizational (operations management)	Process stability/predictability/efficiency	Our organizational processes enable productivity.
	The capabilities that enable consistent execution can also hinder learning and innovation, leaving organizations rigid and inflexible. By optimizing their processes for efficiency in the short term, organizations become brittle (p. 99)	Organizational	Flexibility versus rigidity, efficiency, innovation	Our organizational processes enable learning. Our organizational processes enable innovation.
Yang & Zeng, 2011	The dependent variable is the workers' realization of their productivity potentials, which comes from the 2002 GSS. The survey asked respondents to indicate their level of agreement to the statement that "conditions in my job allow me to be about as productive as I could be" (p. 304) (Single question survey)	Individual	Workplace conditions/circumstances in general	Conditions in my job allow me to be about as productive as I could be.
Wiik, 2011	Self-assessed productivity was represented by the following statements: (i) 'I efficiently perform my work tasks' and (ii) ' I think that I am productive at work' (p. 333)	Individual	Tasks completed with efficiency (output)	I efficiently perform my work tasks. I think that I am productive at work.
Wiik, 2011	"The productivity in office buildings is a function of indoor stimuli, stimuli of the outside world, and unique individual characteristics such as competence, personality, and intelligence" (p. 329)	Individual (office)	Personal environment conditions (input); unique characteristics e.g. competence, personality, and intelligence (input)	My job responsibilities allow me to make good use of my skills and abilities. I am able to contribute to my organization's goals.
Khan, 1993	"Motivation of people is one of the factors that significantly increases their productivity (output/input)" p. 148	Individual	Motivation (input)	I feel motivated at work.
Mak, 2012	Dependent variable: "The last part of the questionnaire comprised two statements regarding changes in office productivity: 'Your office environment reduces your productivity at work,' and 'Noise in your office reduces your productivity at work.' Participants answered the questions on a 5-point scale ranging from 1 (strongly agree) to 5 (strongly disagree)" (p. 341)	Individual	Environment (input)	My office environment reduces my productivity at work (R).

APPENDIX C: ORGANIZATIONAL CLIMATE SCALE (CLIOR)

The following questions were adapted from the Organizational Climate Scale (CLIOR) developed by Peña-Suárez et al. (2013).

In light of your experience at your company or organization, called "here" or "organization" – think about your work environment. For each statement, mark the choice that best describes how much you agree or disagree with the statement. (5-point Likert, 1=strongly disagree; 3=neither agree nor disagree; 5=strongly agree)

1. I have positive relationships with my boss(es).
2. When I have problems, my bosses encourage me so I can solve them.
3. My boss(es) take my suggestions about work seriously.
4. My organization offers opportunities for training.
5. If I need help with my workload, I am given the necessary means to ease the workload.
6. The goals of my work are clearly defined.
7. My bosses are willing to listen to their employees.
8. Others respect the work that I do.
9. In my job, innovative contributions are appreciated.
10. When I do something well, my superiors congratulate me.
11. My work is adequately defined.
12. Deadlines are adequately met.
13. My bosses watch me closely.
14. My work is inadequately supervised.
15. Management makes all important decisions.

APPENDIX D: GENERAL MEASURE OF PERCEIVED PRODUCTIVITY

For the full 29-item (five factor) instrument or the shorter, 18-item (three factor) instrument used in the main survey research, please contact the author:

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APPENDIX E: AFFECTIVE COMMITMENT SURVEY (ACS)

The following instrument was developed by Meyer and Allen (1991, 1997).

For each statement, please respond to the questions by stating how much you agree or disagree with the statement in general. (7-point Likert scale. 1=strongly disagree; 4=neither agree nor disagree; 7=strongly agree)

1. I would be very happy to spend the rest of my career with this organization.
2. I enjoy discussing about my organization with people outside it.
3. I really feel as if this organization's problems are my own.
4. I think that I could easily become as attached to another organization as I am to this one.(R)
5. I do not feel like 'part of the family' at my organization.(R)
6. I do not feel 'emotionally attached' to this organization.(R)
7. This organization has a great deal of personal meaning for me.
8. I do not feel a 'strong' sense of belonging to my organization.(R)

APPENDIX F: GENERAL INSTRUCTIONS AND DEMOGRAPHIC QUESTIONS

In this anonymous, web-based survey you are asked to respond to a total set of 46 questions related to your perceptions related to your work organization. The survey does not collect any personal identification information.

The entire survey is divided into 5 pages and takes approximately 20 to 30 minutes to complete. You should be currently employed to participate in this survey. By submitting the survey, you are agreeing to participate in the research study. If you have any questions regarding this research or are interested in receiving updates related to future research, please send an email to cbdaniel@odu.edu.

Demographic questions (pilot survey):

1. What is your gender? (male, female, prefer not to answer)
2. Please select your age range: 18-24, 25-34, 35-44, 45-54, 55-64, 65+
3. Are you employed within the private or public sector?
4. What is your total work experience?
5. How long have you been employed at your organization?
6. What is the size of your organization?

Demographic questions (main survey):

1. What is your gender? (male, female, prefer not to answer)
2. Please select your age range: 18-24, 25-34, 35-44, 45-54, 55-64, 65+
3. What is your total work experience?
4. How long have you been employed at your organization?

APPENDIX G: CORRELATION MATRIX AND ANTI-IMAGE CORRELATION MATRIX

Table 42: Correlation Matrix for Three-Factor Solution.

	PP1	PP2	PP3	PP4	PP5	PP6	PP7	PP8	PP9
PP1	1.000	.791	.752	.368	.394	.405	.289	.263	.391
PP2	.791	1.000	.770	.291	.347	.440	.363	.338	.432
PP3	.752	.770	1.000	.391	.392	.381	.294	.276	.336
PP4	.368	.291	.391	1.000	.109	.090	-.042	-.045	.067
PP5	.394	.347	.392	.109	1.000	.379	.410	.354	.451
PP6	.405	.440	.381	.090	.379	1.000	.617	.641	.587
PP7	.289	.363	.294	-.042	.410	.617	1.000	.750	.596
PP8	.263	.338	.276	-.045	.354	.641	.750	1.000	.678
PP9	.391	.432	.336	.067	.451	.587	.596	.678	1.000
PP10	.178	.144	.171	.354	.144	.169	.044	-.005	.126
PP11	.379	.376	.412	.432	.153	.279	.167	.139	.210
PP12	.428	.403	.426	.459	.113	.238	.157	.141	.212
PP13	.323	.304	.324	.459	.172	.162	.016	.004	.100
PP14	.659	.572	.607	.344	.377	.356	.261	.288	.389
PP15	.583	.523	.587	.278	.466	.460	.304	.242	.433
PP16	.362	.422	.406	.129	.435	.538	.662	.602	.577
PP17	.331	.368	.311	.068	.427	.743	.644	.642	.694
PP18	.697	.854	.713	.309	.385	.478	.402	.388	.477

Table 43: Correlation Matrix for Three-Factor Solution (continued).

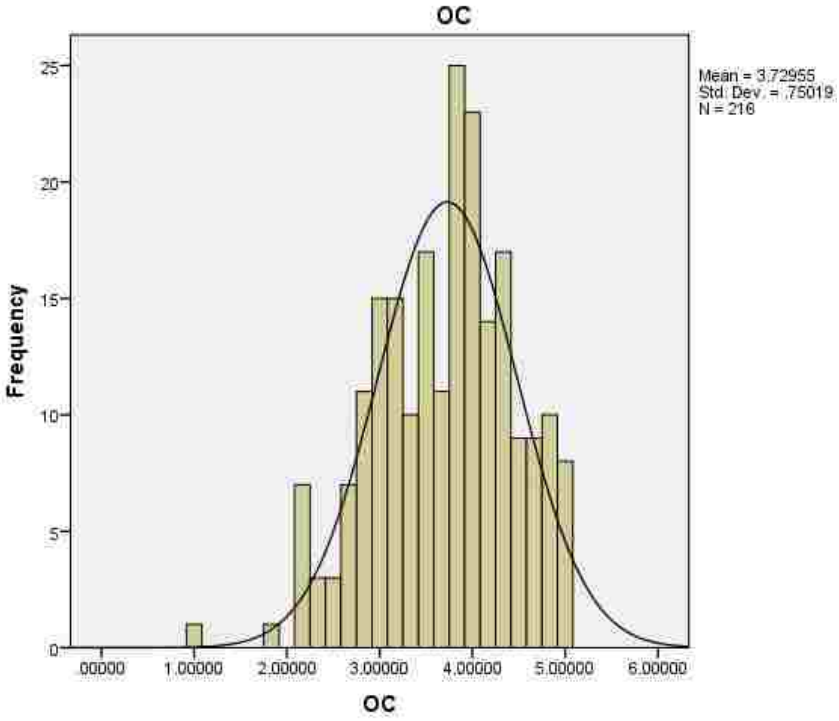
PP10	PP11	PP12	PP13	PP14	PP15	PP16	PP17	PP18
.178	.379	.428	.323	.659	.583	.362	.331	.697
.144	.376	.403	.304	.572	.523	.422	.368	.854
.171	.412	.426	.324	.607	.587	.406	.311	.713
.354	.432	.459	.459	.344	.278	.129	.068	.309
.144	.153	.113	.172	.377	.466	.435	.427	.385
.169	.279	.238	.162	.356	.460	.538	.743	.478
.044	.167	.157	.016	.261	.304	.662	.644	.402
-.005	.139	.141	.004	.288	.242	.602	.642	.388
.126	.210	.212	.100	.389	.433	.577	.694	.477
1.000	.599	.554	.445	.172	.189	.073	.105	.171
.599	1.000	.844	.539	.278	.326	.108	.171	.408
.554	.844	1.000	.578	.266	.307	.106	.140	.402
.445	.539	.578	1.000	.290	.260	.074	.100	.338
.172	.278	.266	.290	1.000	.742	.425	.359	.640
.189	.326	.307	.260	.742	1.000	.462	.481	.583
.073	.108	.106	.074	.425	.462	1.000	.759	.514
.105	.171	.140	.100	.359	.481	.759	1.000	.455
.171	.408	.402	.338	.640	.583	.514	.455	1.000

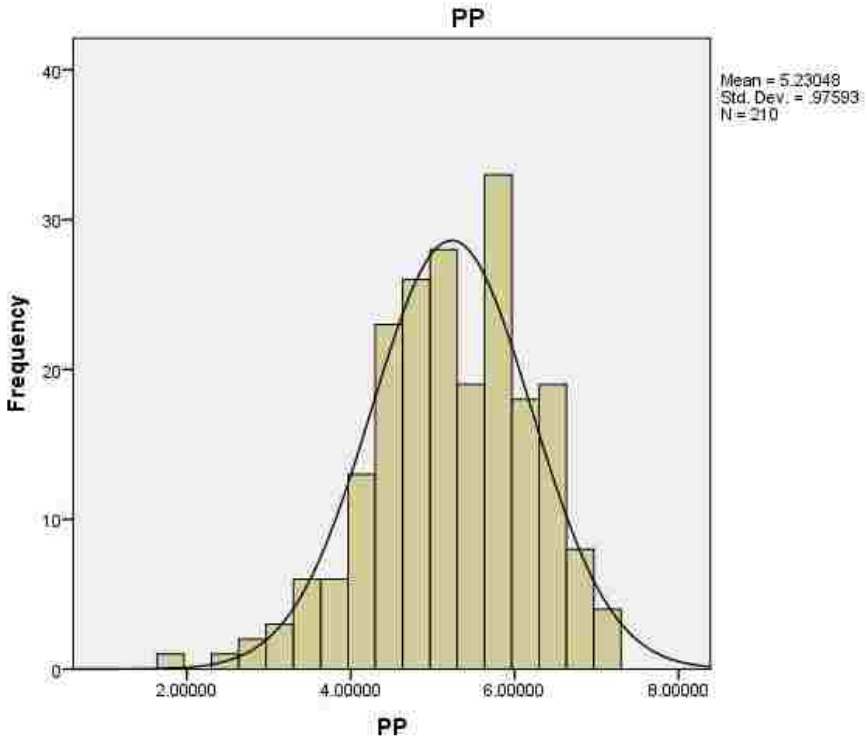
Table 44: Anti-Image Matrix

		q0001_0001	q0002_0001	q0003_0001	q0004_0001	q0005_0001	q0006_0001	q0007_0001	q0008_0001	q0009_0001	q0010_0001	q0011_0001	q0012_0001	q0013_0001	q0014_0001	q0015_0001	q0016_0001	q0017_0001	q0018_0001	q0019_0001	q0020_0001	q0021_0001	q0022_0001	q0023_0001	q0024_0001	q0025_0001	q0026_0001	q0027_0001	q0028_0001	q0029_0001
Anti-image Covariance	q0001_0001	.242	-.107	-.132	-.024	.018	-.040	-.006	-.020	.021	.066	.013	-.033	.002	.031	-.020	.113	-.023	.025	-.029	-.015	.071	-.073	-.067	.024	-.020	.011	.008	-.004	.010
	q0002_0001	-.107	.272	-.023	.034	.049	-.007	-.001	1.879 E-6	-.022	-.040	-.042	.056	-.001	-.029	.033	-.031	.034	.002	.018	.056	-.093	.062	.002	-.019	.027	.041	.001	-.018	.038
	q0003_0001	-.132	-.023	.376	.000	-.075	.055	.006	.047	-.028	-.093	.058	.075	-.023	.033	.015	-.072	.049	-.067	.033	.004	-.064	.057	.026	.005	-.005	.054	.042	.023	.004
	q0004_0001	-.024	.034	.000	.376	.042	-.013	-.024	.086	.047	-.023	.037	-.078	.047	-.009	-.048	-.047	-.084	-.038	.056	-.060	.030	-.043	-.056	.010	-.005	-.052	-.061	.002	.002
	q0005_0001	.018	.049	-.075	.042	.345	-.064	-.058	.018	.016	.030	-.067	.054	-.029	-.020	-.050	.001	-.017	.025	.012	-.094	.058	-.025	-.045	.029	-.026	-.066	-.039	.025	.012
	q0006_0001	-.040	-.007	.055	-.013	-.064	.313	-.097	-.020	.005	-.035	-.024	.016	.043	-.065	.028	-.031	-.026	.007	.001	-.007	-.044	.048	-.027	.003	.002	.018	.006	.057	-.071
	q0007_0001	-.006	-.001	.006	-.024	-.058	-.097	.190	-.054	-.096	-.020	.013	-.033	.033	.008	-.010	.049	.017	-.043	-.008	.020	-.008	.011	.057	-.020	-.012	.035	.055	.002	.007
	q0008_0001	-.020	1.879 E-6	.047	.086	.018	-.020	-.054	.372	-.018	-.018	.001	.026	.045	-.038	.020	-.068	-.072	.056	.023	-.015	-.030	-.026	-.035	.002	.017	-.052	-.117	-.059	.048
	q0009_0001	.021	-.022	-.028	.047	.016	.005	-.096	-.018	.197	.059	-.052	-.022	-.039	.053	-.020	-.017	-.019	7.280 E-5	.068	.007	.060	-.070	-.014	.016	-.011	-.064	-.075	.003	-.013
	q0010_0001	.066	-.040	-.093	.023	.030	-.035	.020	.018	.059	.338	.047	-.047	.019	.046	-.037	-.033	.052	.097	-.042	.065	.069	-.057	.039	.034	-.027	.104	-.005	-.004	.018
	q0011_0001	.013	-.042	-.058	.037	-.067	-.024	.013	.001	-.052	.047	.389	-.064	.022	.007	.021	-.022	.023	.021	-.028	.044	-.016	-.019	.025	-.012	-.009	.003	.004	-.057	.023
	q0012_0001	.033	.056	.075	.078	.054	.016	.033	.026	-.022	.047	-.064	.416	-.062	.017	.004	-.035	.015	-.046	-.068	.005	-.072	.078	.010	.022	.000	.029	.000	.023	.056
	q0013_0001	.002	-.001	-.023	.047	-.029	.043	.033	.045	-.039	.019	.022	-.062	.350	-.126	-.078	-.030	.101	-.020	.053	.027	-.017	.024	.005	-.014	.011	.035	-.037	.024	.023
	q0014_0001	.031	-.029	-.033	-.009	-.020	-.065	.008	-.038	.053	.046	.007	-.017	-.126	.489	-.129	.036	.043	.011	-.048	.018	.050	-.046	.032	.001	.005	.001	-.029	.023	.032
	q0015_0001	-.020	.033	.015	-.048	-.050	.028	-.010	.020	-.020	-.037	.021	.004	-.078	-.129	.278	-.069	-.013	.042	-.005	.024	-.045	.019	.033	-.012	.002	-.079	.033	-.060	.012
	q0016_0001	.113	-.031	-.072	-.047	.001	-.031	.049	-.068	-.017	-.033	-.022	-.035	-.030	.036	-.069	.356	-.032	-.027	-.037	.050	.049	-.084	-.010	.019	-.029	.022	.000	.026	.042
	q0017_0001	-.023	-.034	.049	-.084	-.017	-.026	.017	-.072	-.019	-.052	-.023	-.015	-.101	.043	-.013	-.032	.312	-.109	-.060	.023	.005	.044	.010	-.011	.009	.073	.044	-.028	.022
	q0018_0001	.025	.002	-.067	-.038	.025	.007	-.043	.056	7.280 E-5	.097	.021	-.046	-.020	.011	.042	-.027	-.109	.310	-.093	-.060	.024	-.027	-.003	.017	.001	-.067	-.019	-.005	.003
	q0019_0001	-.029	.018	.033	.056	.012	.001	-.008	.023	.068	-.042	-.028	-.068	.053	-.048	-.005	-.037	-.060	-.093	.273	.008	-.009	-.040	.000	-4.092 E-5	-.007	-.089	-.056	.015	.005
	q0020_0001	-.015	-.056	-.004	.060	-.094	-.007	.020	-.015	.007	-.065	.044	-.005	-.027	.018	.024	.050	.023	-.060	.008	.265	-.047	-.042	.012	-.002	-.013	.056	.019	-.046	.035
	q0021_0001	.071	-.093	-.064	.030	.058	-.044	-.008	-.030	.060	.069	-.016	-.072	-.017	.050	-.045	.049	.005	.024	-.009	-.047	.236	-.117	-.007	.036	-.037	-.026	-.056	-.007	.018
	q0022_0001	.073	.062	.057	.043	-.025	.048	.011	-.026	-.070	-.057	.019	.078	.024	-.046	.019	-.084	.044	-.027	-.040	.042	-.117	.192	.026	-.050	.055	.066	.052	-.013	.048
	q0023_0001	-.067	-.002	-.026	.056	-.045	-.027	.057	-.035	-.014	-.039	.025	-.010	-.005	.032	.033	-.010	.010	-.003	.000	-.012	-.007	-.026	.322	-.022	.001	.037	-.014	-.034	.006
	q0024_0001	.024	-.019	.005	.010	.029	.003	.020	.002	.016	.034	-.012	.022	.014	.001	-.012	.019	.011	.017	-4.092 E-5	-.002	.036	-.050	-.022	.109	-.083	.030	-.002	.035	.007
	q0025_0001	-.020	.027	-.005	-.005	-.026	.002	-.012	.017	-.011	-.027	-.009	.000	.011	.005	.002	-.029	.009	.001	-.007	-.013	-.037	.055	.001	-.083	.088	.021	-.014	-.030	-.013
	q0026_0001	-.011	-.041	.054	-.052	-.066	.018	.035	-.052	-.064	-.104	-.003	.029	-.035	.001	-.079	.022	.073	-.067	-.089	.056	-.026	.066	-.037	-.030	.021	.288	.063	.022	-.006
	q0027_0001	.008	.001	.042	-.061	-.039	.006	.055	-.117	-.075	-.005	.004	.000	-.037	-.029	.033	.000	.044	-.019	-.056	.019	-.056	.052	-.014	-.002	-.014	.063	.288	-.029	-.092
	q0028_0001	-.004	-.018	.023	.002	.025	.057	.002	-.059	.003	-.004	-.057	.023	.024	.023	-.060	.026	-.028	-.005	.015	.046	-.007	-.013	-.034	.035	-.030	.022	-.029	.411	-.100
	q0029_0001	.010	-.038	-.004	.002	.012	-.071	.007	.048	-.013	.018	-.023	-.056	-.023	.032	.012	.042	.022	.003	.005	.035	.018	-.048	.006	-.007	-.013	.006	-.092	-.100	.286
Anti-image Correlation	q0001_0001	.783[a]	-.415	-.438	.078	.063	-.144	-.026	-.067	.096	.231	.044	-.104	.005	.091	-.078	.384	-.083	.092	-.112	.059	.295	-.339	.241	.146	-.138	.043	.032	-.014	.038
	q0002_0001	.415	.863[a]	-.072	.105	.159	-.025	-.007	5.904 E-6	-.095	-.132	-.128	.168	-.004	.078	.119	-.100	.116	.006	.066	.210	-.368	.273	.007	-.112	.177	-.148	.003	-.054	.135
	q0003_0001	-.438	-.072	.787[a]	.000	-.207	.159	.023	.126	-.103	-.261	-.151	.189	-.064	-.076	.048	-.196	.144	-.197	.104	-.012	-.215	.212	-.073	.026	-.026	.163	.129	.060	.013
	q0004_0001	-.078	.105	.000	.859[a]	.117	-.037	-.090	.229	.173	-.065	.096	-.196	.128	-.020	-.149	-.127	-.247	-.110	.175	-.192	.102	-.159	-.160	.052	-.028	-.157	-.184	.005	-.006
	q0005_0001	.063	.159	-.207	.117	.869[a]	-.195	-.227	.050	.061	.088	-.183	.141	-.082	-.049	-.163	.004	-.052	.078	.038	-.312	.205	-.098	-.136	.150	-.151	-.208	-.123	.066	.038
	q0006_0001	-.144	-.025	.159	-.037	-.195	.892[a]	-.400	-.058	.018	-.108	-.068	.045	.130	-.167	.094	-.093	-.082	.024	.004	-.025	-.163	.195	-.086	.015	.012	.060	.018	.158	-.237
	q0007_0001	-.026	-.007	.023	-.090	-.227	-.400	.831[a]	-.205	-.494	-.078	.048	-.117	.129	.025	-.042	.189	.069	-.178	-.036	.089	-.037	.057	.232	-.140	-.090	.149	.234	.007	.028
	q0008_0001	-.067	5.904 E-6	.126	.229	.050	-.058	-.205	.874[a]	-.067	-.052	.004	.067	.124	-.088	.061	-.186	-.212	.164	.073	-.048	-.102	-.096	-.100	.011	.093	-.160	-.357	-.152	.147
	q0009_0001	.096	-.095	-.103	.173	.061	.018	.494	-.067	.817[a]	.230	-.188	-.075	-.148	.169	-.085	-.065	-.078	.000	.293	.029	.276	-.360	.055	.112	-.085	-.270	-.314	.011	.055
	q0010	.231	-.132	-.261	-.065	.088	-.108	-.078	-.052	.230	.812[a]	.129	-.126	.057	.113	-.122	-.095	-.161	.300	-.138	-.218	.243	-.225	-.119	.179	-.154	-.332	-.017	-.011	.057

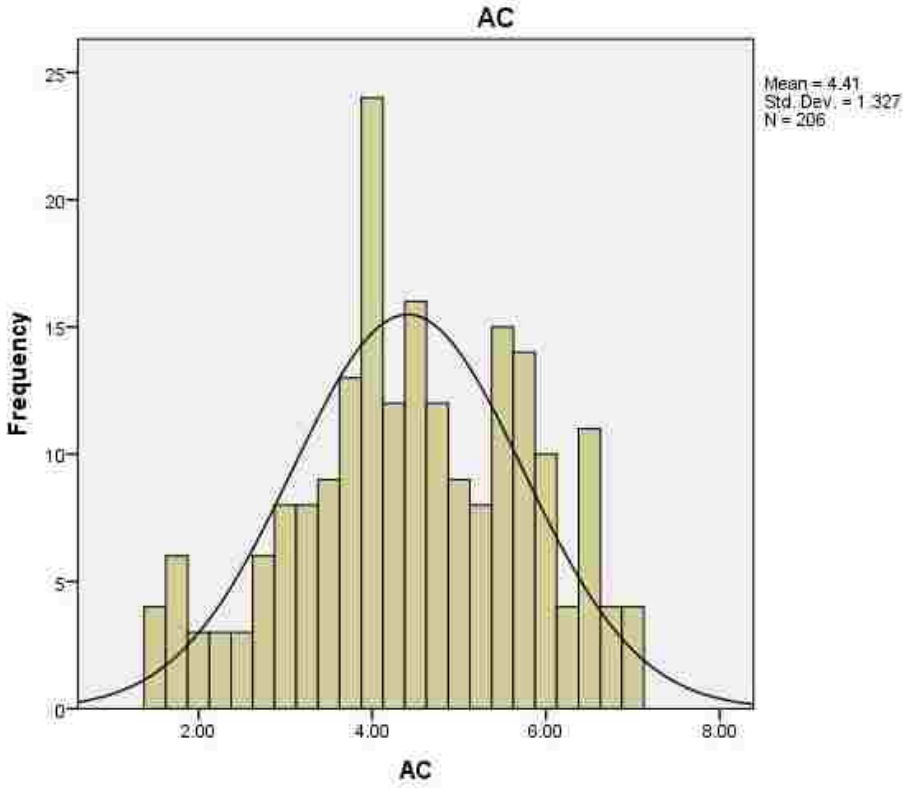
_0001																													
q0011 _0001	.044	-.128	-.151	.096	-.183	-.068	.048	.004	-.188	.129	.941ª	-.160	.059	.017	.063	-.060	.066	.061	-.086	.138	-.052	-.068	.072	-.057	-.049	.009	.013	-.143	.067
q0012 _0001	-.104	.168	.189	-.196	.141	.045	-.117	.067	-.075	-.126	-.160	.829ª	-.163	-.037	.012	-.092	-.041	-.128	-.202	-.016	-.230	.277	-.028	.105	-.001	.085	-.001	.055	-.161
q0013 _0001	.005	-.004	-.064	.128	-.082	.130	.129	.124	-.148	.057	.059	-.163	.837ª	-.305	-.250	-.084	-.305	-.061	.172	-.090	-.058	.094	-.016	-.070	.064	-.109	-.117	.063	-.073
q0014 _0001	.091	-.078	-.076	-.020	-.049	-.167	.025	-.088	.169	.113	.017	-.037	-.305	.761ª	-.348	.087	.109	.028	-.132	.050	.147	-.149	.080	.005	.025	.003	-.077	.051	.084
q0015 _0001	-.078	.119	.048	-.149	-.163	.094	-.042	.061	-.085	-.122	.063	.012	-.250	-.348	.842ª	-.220	-.046	.141	-.018	.090	-.174	.080	.111	-.070	.015	-.278	.117	-.176	.043
q0016 _0001	.384	-.100	-.196	-.127	.004	-.093	.189	-.186	-.065	-.095	-.060	-.092	-.084	.087	-.220	.813ª	-.095	-.083	-.120	.164	.168	-.320	-.029	.095	-.161	.070	-.001	.068	.131
q0017 _0001	-.083	-.116	.144	-.247	-.052	-.082	.069	-.212	-.078	-.161	-.066	-.041	-.305	.109	-.046	-.095	.847ª	-.350	-.207	.082	.017	.179	.033	-.061	.056	.243	.148	-.077	.073
q0018 _0001	.092	.006	-.197	-.110	.078	.024	-.178	.164	.000	.300	.061	-.128	-.061	.028	.141	-.083	-.350	.837ª	-.321	-.210	.088	-.111	-.010	.092	.006	-.225	-.065	-.013	.011
q0019 _0001	-.112	.066	.104	.175	.038	.004	.036	.073	.293	-.138	.086	-.202	.172	.132	-.018	-.120	-.207	-.321	.858ª	.030	-.035	-.174	.001	.000	-.043	.319	-.200	.045	.019
q0020 _0001	-.059	-.210	-.012	-.192	-.312	-.025	.089	-.048	.029	-.218	.138	-.016	-.090	.050	.090	.164	.082	-.210	.030	.893ª	-.187	-.184	-.041	-.011	-.084	.203	.068	-.141	.127
q0021 _0001	.295	-.368	-.215	.102	.205	-.163	.037	-.102	.276	.243	-.052	-.230	-.058	.147	-.174	.168	.017	.088	-.035	.187	.792ª	-.550	.024	.227	-.259	.102	-.215	-.023	.068
q0022 _0001	-.339	.273	.212	-.159	-.098	.195	.057	-.096	-.360	-.225	-.068	.277	.094	-.149	.080	-.320	.179	-.111	-.174	-.184	-.550	.700ª	-.103	-.344	.427	.281	.220	-.047	.203
q0023 _0001	-.241	-.007	-.073	-.160	-.136	-.086	.232	-.100	-.055	-.119	.072	-.028	-.016	.080	.111	-.029	.033	-.010	.001	-.041	-.024	-.103	.945ª	-.117	.008	-.123	-.046	-.093	.018
q0024 _0001	.146	-.112	.026	.052	.150	.015	-.140	.011	.112	.179	-.057	.105	-.070	.005	-.070	.095	-.061	.092	.000	-.011	.227	-.344	-.117	.781ª	-.842	-.171	-.009	.168	-.042
q0025 _0001	-.138	.177	-.026	-.028	-.151	.012	-.090	.093	-.085	-.154	-.049	-.001	.064	.025	.015	-.161	.056	.006	-.043	-.084	-.259	.427	.008	-.842	.794ª	.131	-.090	-.158	-.083
q0026 _0001	-.043	-.148	.163	-.157	-.208	.060	.149	-.160	-.270	-.332	-.009	.085	-.109	.003	-.278	.070	.243	-.225	-.319	.203	-.102	.281	-.123	-.171	.131	.776ª	.218	.064	-.020
q0027 _0001	.032	.003	.129	-.184	-.123	.018	.234	-.357	-.314	-.017	.013	-.001	-.117	-.077	.117	-.001	.148	-.065	-.200	.068	-.215	.220	-.046	-.009	-.090	.218	.856ª	-.085	-.319
q0028 _0001	-.014	-.054	.060	.005	.066	.158	.007	-.152	.011	-.011	-.143	.055	.063	.051	-.176	.068	-.077	-.013	.045	-.141	-.023	-.047	-.093	.168	-.158	.064	-.085	.927ª	-.291
q0029 _0001	.038	-.135	-.013	.006	.038	-.237	.028	.147	-.055	.057	.067	-.161	.073	.084	.043	.131	.073	.011	.019	.127	.068	-.203	.018	-.042	-.083	.020	-.319	-.291	.918ª

APPENDIX H: DATA FREQUENCY HISTOGRAMS





APPENDIX H: DATA FREQUENCY HISTOGRAMS (CONTINUED)



APPENDIX I: MODERATION VS. MEDIATION

Because it is not uncommon for the terms "moderation" and "mediation" to be incorrectly used interchangeably by researchers, the section first provides a brief explanation of the difference in the concepts. The difference between a moderator variable and a mediator variable is that a moderator variable has a direct influence on the relationship between two other variables. A mediator variable does not influence an existing relationship; rather, it forms a separate indirect relationship (MacKinnon, 2008). Mediation means that X influences M, which in turn influences Y. If X influences the variable M, which in turn influences the variable Y, then M is described as a *mediating* variable. If M affects the strength of the relationship between X and Y, it is a *moderating* variable. The moderation construct is adopted in this research; however, further discussion is provided here about how mediation could be used in further research in this area.

Baron and Kenny (1986)'s work, one of the most popular works in the area of moderation and mediation, provided some interesting insights about moderation and mediation. A moderator, or an interacting variable, can affect the strength between two variables, and can explain when or under what conditions the effect occurs (Baron & Kenny, 1986). A mediator is a variable that intervenes between the relationship between an input and output and explains how or why such effects occur (Baron & Kenny, 1986). According to the researchers, depending on research goals, moderators and mediators can fulfill various strategic purposes. Some researchers find that choosing to begin with either a moderator approach leads to pursuing the mediator process, or vice versa. Discovery of a moderator or mediator variable is sometimes the first step toward

identifying other underlying dimensions within a theory or construct. In future research, the results of moderation analysis may lead to mediation analysis in a given area, which may utilize more advanced statistical techniques which employ various combinations of variables and interactions.

Baron and Kenny (1986) outlined the following procedure for testing for mediation:

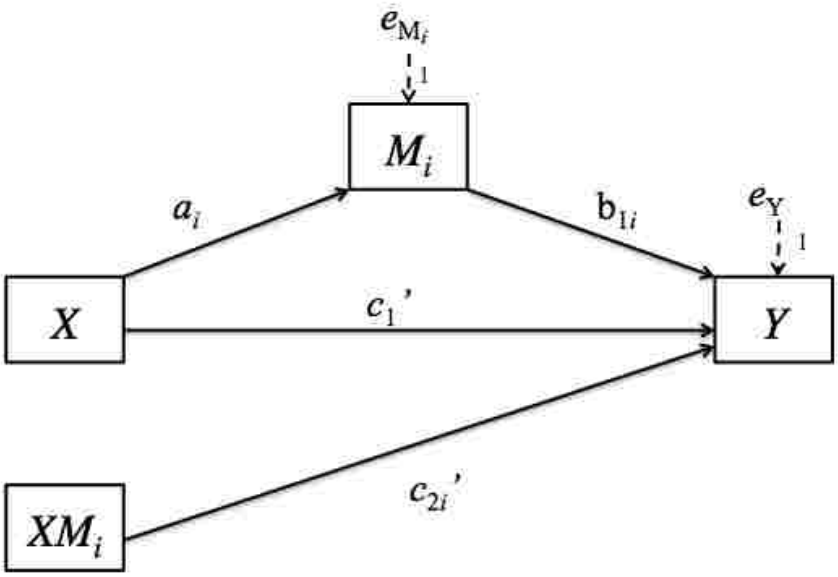
1. Variations in levels of the independent variable significantly account for variations in the presumed mediator (Path *a*)
2. Variations in levels of the presumed mediator significantly account for variations in the dependent variable (Path *b*)
3. When Paths *a* and *b* are controlled, a previously significant relation between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when Path *c* is zero.

In the case in which Path *c* is reduced to zero, strong evidence exists for a single, dominant mediator; alternatively, if residual Path *c* is not zero, partial mediation is possible, an indication that the operation of multiple mediating factors (Baron & Kenny, 1986).

Testing for mediation and indirect effects. In the social psychology domain, it is likely that a phenomenon, in a particular affective commitment, has multiple causes. As such, it is often a realistic goal to instead seek mediators that significantly decrease Path *c* rather than eliminating the relation between the independent and the dependent variables altogether. From a theoretical standpoint, significant reduction in the relationship between the independent and dependent variable demonstrates that a given mediator is

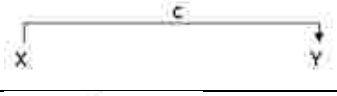
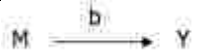
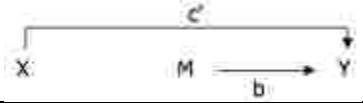
"indeed potent, albeit not both a necessary and a sufficient condition for an effect to occur" (Baron & Kennedy, 1986, p. 1176). The purpose of the inquiry is to discover how an intervening variable explains part of the relationship between an independent and dependent variable, as shown in Figure 15:

Figure 15: Mediation Model (adapted from Hayes, 2013)



The following four-step approach (Table 45) can be used to test for mediation (Baron & Kenny, 1986), where X represents the independent variable (organizational climate dimensions), Y represents the dependent variable (affective commitment), and M represents the mediating variable (perceived productivity):

Table 45: Procedure to Test for Mediation

Step	Analysis	Equation	Visual depiction
1	Simple regression analysis with X predicting Y to test for path c alone	$Y = B_0 + B_1X + e$	
2	Simple regression analysis with X predicting M to test for path a	$M = B_0 + B_1X + e$	
3	Simple regression analysis with M predicting Y to test for the significance of path b alone	$Y = B_0 + B_1M + e$	
4	Multiple regression analysis with X and M predicting Y	$Y = B_0 + B_1X + B_2M + e$	

Note that the significance of the coefficients is analyzed at each step. In the final regression analysis, some form of mediation is demonstrated if the effect of M (path *b*) remains significant when X is held constant. Full mediation is demonstrated if X is no longer significant when M is controlled. This finding supports partial mediation if X is still significant when M is controlled (i.e. both the X and M significantly predict Y).

Calculation of the indirect effect is necessary to minimize the risk of avoiding a Type II error (false negative) (MacKinnon, 2008). The Judd and Kenny Difference of Coefficients Approach (Judd & Kenny, 1981) can be used estimate the indirect coefficient, which involves two regressions:

$$Y = B_0 + B_1X + B_2M + e \qquad (1)$$

$$Y = B_0 + B_1X + e \qquad (2)$$

Using this approach, the partial regression coefficient B_1 shown in equation (1) is subtracted from the zero order, simple regression coefficient B shown in equation (2). The indirect effect is measured using equation (3).

$$B_{indirect} = B - B_1 \qquad (3)$$

Sobel's test for significance of the mediation effect is an alternative method that can be used for comparison. While Sobel's is a more conservative (i.e. less powerful) test and is more sensitive to sample size (less conservative with smaller samples), simulation studies have found that the estimator for standard error shows low bias for sample sizes of at least 50 in a single-mediator model (MacKinnon, Warsi, & Dwyer, 1995).

"Moderation is a special type of ANOVA interaction, and mediation is a special type of path model" (Jose, 2013, p. 7). A mediator variable "accounts for the relation between a predictor and the criterion" (Baron & Kenny, 1986, p. 1176). Without the mediator in a case of mediation, the path between the independent and the dependent variable can become insignificant and the path becomes disconnected. In moderation models, the relationship between an independent variable and dependent variable still exists, however, its strength or direction may change based on the presence of a defined moderator.

APPENDIX J: PROCESS ADD-ON OUTPUT

```
Run MATRIX procedure:

*************** PROCESS Procedure for SPSS Release 2.13.2 *************
*

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com

    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
**

Model = 1

    Y = AC

    X = OC

    M = PP


Sample size

        206


**************************************************************************
**

Outcome: AC


Model Summary

          R       R-sq        MSE          F        df1        df2          p

      .6800      .4624      .5456    63.8435     3.0000   202.0000      .0000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	-.0968	.0664	-1.4575	.1465	-.2278	.0342
PP	.2162	.0997	2.1684	.0313	.0196	.4127
OC	.5290	.0923	5.7337	.0000	.3471	.7110
int_1	.1275	.0561	2.2725	**.0241**	.0169	.2381

Interactions:

int_1	OC	X	PP

****
*

Conditional effect of X on Y at values of the moderator(s):

PP	Effect	se	t	p	LLCI	ULCI
-1.0008	.4015	.1159	3.4644	.0006	.1730	.6300
.0000	.5290	.0923	5.7337	.0000	.3471	.7110
1.0008	.6566	.0995	6.5984	.0000	.4604	.8528

Values for quantitative moderators are the mean and plus/minus one SD fr
om mean.

Values for dichotomous moderators are the two values of the moderator.

********** JOHNSON-
NEYMAN TECHNIQUE **********

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above

-1.8368 3.3981 96.6019

Conditional effect of X on Y at values of the moderator (M)

PP	Effect	se	t	p	LLCI	ULCI
-4.2148	-.0083	.2680	-.0308	.9754	-.5368	.5202
-3.9170	.0297	.2524	.1177	.9064	-.4679	.5273
-3.6192	.0677	.2369	.2856	.7754	-.3994	.5347
-3.3214	.1056	.2215	.4768	.6340	-.3312	.5425
-3.0236	.1436	.2064	.6956	.4875	-.2634	.5506
-2.7258	.1816	.1916	.9477	.3444	-.1962	.5593
-2.4280	.2195	.1770	1.2399	.2164	-.1296	.5686
-2.1302	.2575	.1629	1.5803	.1156	-.0638	.5787
-1.8368	.2949	.1496	1.9718	.0500	.0000	.5898
-1.8324	.2954	.1494	1.9781	.0493	.0009	.5899
-1.5346	.3334	.1365	2.4428	.0154	.0643	.6025
-1.2368	.3714	.1245	2.9823	.0032	.1258	.6169
-.9390	.4093	.1138	3.5980	.0004	.1850	.6337
-.6412	.4473	.1046	4.2770	.0000	.2411	.6535
-.3434	.4853	.0974	4.9813	.0000	.2932	.6773
-.0457	.5232	.0927	5.6419	.0000	.3404	.7061
.2521	.5612	.0909	6.1711	.0000	.3819	.7405
.5499	.5992	.0922	6.4999	.0000	.4174	.7809
.8477	.6371	.0963	6.6129	.0000	.4471	.8271
1.1455	.6751	.1031	6.5490	.0000	.4718	.8783
1.4433	.7130	.1119	6.3707	.0000	.4923	.9337
1.7411	.7510	.1224	6.1345	.0000	.5096	.9924

****

```
Data for visualizing conditional effect of X on Y

Paste text below into a SPSS syntax window and execute to produce plot.


DATA LIST FREE/OC PP AC.

BEGIN DATA.

     -.9859    -1.0008     -.7089

      .0000    -1.0008     -.3132

      .9859    -1.0008      .0826

     -.9859      .0000     -.6184

      .0000      .0000     -.0968

      .9859      .0000      .4247

     -.9859     1.0008     -.5279

      .0000     1.0008      .1195

      .9859     1.0008      .7668


END DATA.

GRAPH/SCATTERPLOT=OC WITH AC BY PP.


****************** ANALYSIS NOTES AND WARNINGS ************************
**


Level of confidence for all confidence intervals in output:

    95.00


NOTE: The following variables were mean centered prior to analysis:

 OC       PP
```

```
NOTE: Some cases were deleted due to missing data.  The number of such c
ases was:

  10


NOTE: All standard errors for continuous outcome models are based on
the HC3 estimator


------ END MATRIX -----
```

APPENDIX K: OTHER INSTRUMENTS FOR POTENTIAL FUTURE RESEARCH

From the 19 instruments of organizational climate that were reviewed for potential use, the Organizational Climate Measure (OCM) by Patterson et al. (2004) initially seemed most suitable for the purposes of this research study, for two reasons: (1) it has been proven by external studies to be psychometrically sound, unlike many of the rest; and (2) it is theoretically grounded in the widely popular *Competing Values Framework* (CVF) used to assess organizational culture (Quinn & Rohrbaugh, 1981). The CVF is the most widely used organizational culture taxonomy in the literature, with applications in over 10,000 organizations globally (Cameron et al., 2006; Hartnell, Ou, & Kinicki, 2011; Ostroff et al., 2003). This framework guided the development of the Organizational Climate Measure (OCM) (Patterson et al., 2004), in which it is theoretically grounded. This instrument has demonstrated empirical validity, internal reliability, and stability for measuring climate to induce understanding and change. It has also been widely used to investigate relationships with outcomes (dependent variables) of interest.

Dimensions. The OCM consists of 82 items forming 17 climate dimensions (Appendix H). The interpretations for each dimension are listed in Table 46 below.

Table 46: Climate Dimensions from OCM (Patterson et al., 2004, 2005).

#	Variable	Interpretation
1	Autonomy	The extent that jobs are designed in ways which give employees wide scope to enact work
2	Integration	The extent of interdepartmental trust and cooperation
3	Involvement	The extent of employee influence on decision-making
4	Supervisory support	The extent to which employees experience support and understanding from their immediate supervisor
5	Training	The extent to which an organization is concerned with developing employee skills
6	Welfare	The extent to which an organization cares about its employees
7	Formalization	The extent to which an organization is concerned with formal rules and procedures
8	Tradition	The extent to which established ways of doing things are valued
9	Innovation and flexibility	The extent of encouragement and support for new ideas and innovative approaches, and an orientation toward adaptation
10	Outward focus	The extent to which the organization is responsive to the needs of the customer and the marketplace in general
11	Reflexivity	The extent to which an organization is concerned with reviewing and reflecting upon objectives, strategies, and work processes, to adapt to the wider environment
12	Clarity of organizational goals	The extent to which an organization is concerned with clearly defining the goals of the organization
13	Efficiency	The degree of importance placed on employee efficiency and productivity at work
14	Effort	How hard people in organizations work towards achieving goals
15	Performance feedback	The extent to which an organization provides measurement and feedback of job performance
16	Pressure to produce	The extent of pressure for employees to meet targets
17	Quality	The emphasis given to quality procedures

Design. Dimensions are derived from four major schools of the study of organizational effectiveness, reflecting long traditions in management and organizational philosophy: the human relations approach, the internal process approach, the open systems approach, and the rational goal approach. These four philosophies represent ideologies on two axes: stability versus flexibility, and internal versus external focus. Each of the 17 dimensions is mapped to each of the four culture types.

Reliability and validity. Bernstrøm (2009) conducted both confirmatory and exploratory factor analysis on the OCM, confirmed the model fit, and supported the 17-

latent factor model. The external analysis not only confirmed the latent factor structure, it was found to be the "best fit for the data" that was collected on 555 Norwegians employed by a subsidiary of an international company. The instrument was translated from English, providing construct validity for the original OCM.

Patterson et al. (2005) established concurrent validity by correlating employees' ratings with managers' and interviewers' descriptions of managerial practices and organizational characteristics. The study was conducted on 6,869 employees from 55 manufacturing firms. The OCM was shown to exhibit predictive validity, using measures of performance and innovation. The instrument also discriminated effectively between organizations, demonstrating good discriminant validity (Patterson et al., 2005).

Bernstrøm's (2009) external study determined that the OCM is a reliable organizational climate measure with good generalizability, as shown in Table 47:

Table 47: OCM Internal Reliability Coefficients Table (Bernstrøm, 2009)

Scale	Cronbach alpha
Autonomy	0.666
Integration	0.791
Involvement	0.795
Supervisory support	0.858
Training	0.764
Welfare	0.904
Formalization	0.819
Tradition	0.810
Innovation & flexibility	0.844
Outward focus	0.835
Reflexivity	0.721
Clarity of organizational	0.876
Efficiency	0.850
Effort	0.838
Performance feedback	0.804
Pressure to produce	0.790
Quality	0.754

As shown in Table 8, the internal reliability coefficients for all 17 dimensions of the OCM are above .60, which is considered acceptable (Hair et al., 2006), although many authors argue that above .70 is preferred. In this external analysis, every dimension but one has an alpha above .70 (Bernstrøm, 2009).

Although having high Cronbach's alphas is one of the central tenets of classical test theory (Steiner, 2003), there is also an argument against the consideration of using it as the sole indicator of internal consistency, since redundant items can artificially inflate the alphas. Patterson et al. (2005) also commented on the semantic context and inter-item

correlations, noting the factorially distinct dimensions that provide for a robust instrument.

Linkage to Competing Values Framework. A major strength of the OCM is its theoretical grounding in the Competing Values Framework (CVF), as demonstrated in Table 48:

Table 48: OCM Grounding in CVF (Patterson et al., 2004; Patterson et al., 2005)

CVF Quadrant	Beliefs	Values	Effectiveness criteria	Corresponding OCM Dimensions
Clan	People behave appropriately when they have trust in, loyalty to, and membership in the organization.	Teamwork, participation, attachment, collaboration, trust, support, affiliation, involvement, open communication, engagement, diversity, empowerment	Satisfaction & commitment	• Autonomy • Integration • Involvement • Supervisory support • Training • Welfare
Adhocracy	People behave appropriately when they understand the importance and impact of the task.	Stimulation, variety, autonomy, risk taking, creativity, adaptability, innovation, creativity, service and continuous improvement	Innovation	• Innovation & flexibility • Outward focus • Reflexivity
Hierarchy	People behave appropriately when they have clear roles and procedures are formally defined by rules and regulations.	Conformity and predictability, routinization, formalization, fairness, quality assurance, safety, compliance	Efficiency, timeliness, smoothness, functionality	• Formalization • Tradition
Market	People behave appropriately when they have clear objectives and are rewarded based on the achievements.	Communication, competition, competence, achievement, goal setting, task focus, aggressiveness	Productivity, profit, quality, performance	• Clarity of organizational goals • Efficiency • Effort • Performance feedback • Pressure to produce • Quality

Organizational Climate Measure (OCM) (Patterson et al., 2005)
Please respond using 4-point Likert scale with respect to how much you agree the statement is true for your organization: definitely false, mostly false, mostly true, and definitely true.

AUTONOMY (Human Relations)
1. Management let people make their own decisions much of the time.
2. Management trust people to make work-related decisions without getting permission first.
3. People at the top tightly control the work of those below them.
4. Management keep too tight a reign on the way things are done around here.
5. It's important to check things first with the boss before making a decision.
INTEGRATION (Human Relations)
6. People are suspicious of other departments.
7. There is very little conflict between departments here.
8. People in different departments are prepared to share information.
9. Collaboration between departments is very effective.
10. There is very little respect between some of the departments here.
INVOLVEMENT (Human Relations)
11. Management involve people when decisions are made that affect them.
12. Changes are made without talking to the people involved in them.
13. People don't have any say in decisions which affect their work.
14. People feel decisions are frequently made over their heads.
15. Information is widely shared.
16. There are often breakdowns in communication here.
SUPERVISORY SUPPORT (Human Relations)
17. Supervisors here are really good at understanding peoples' problems.
18. Supervisors show that they have confidence in those they manage.
19. Supervisors here are friendly and easy to approach.
20. Supervisors can be relied upon to give good guidance to people.
21. Supervisors show an understanding of the people who work for them.
TRAINING (Human Relations)
22. People are not properly trained when there is a new machine or technology.
23. People receive enough training when it comes to using new equipment or software.
24. The organization only gives people the minimum amount of training they need to do their job.
25. People are strongly encouraged to develop their skills.
WELFARE (Human Relations)
26. This organization pays little attention to the interests of employees.
27. This organization tries to look after its employees.
28. This organization cares about its employees.
29. This organization tries to be fair in its action towards employees.
FORMALIZATION (Internal Process)

30. It is considered extremely important here to follow the rules.
31. People can ignore formal procedures and rules if it helps get the job done.
32. Everything has to be done by the book.
33. It is not necessary to follow procedures to the letter around here.
34. Nobody gets too upset if people break the rules around here.
TRADITION (Internal Process)
35. Senior management like to keep to established, traditional ways of doing things.
36. The way this organization does things has never changed very much.
37. Management are not interested in trying out new ideas.
38. Changes in the way things are done here happen very slowly.
INNOVATION AND FLEXIBILITY (Open Systems)
39. New ideas are readily accepted here.
40. This organization is quick to respond when changes need to be made.
41. Management are quick to spot the need to do things differently.
42. This organization is very flexible; it can quickly change procedures to meet new conditions and solve problems as they arise.
43. Assistance in developing new ideas is readily available.
44. People in this organization are always searching for new ways of looking at problems.
OUTWARD FOCUS (Open Systems)
45. This organization is quite inward looking; it does not concern itself with what is happening in the marketplace.
46. Ways of improving service to the customer are not given much thought.
47. Customer needs are not considered top priority here.
48. The organization is slow to respond to the needs of the customer.
49. This organization is continually looking for new opportunities in the market place.
REFLEXIVITY (Open Systems)
50. In this organization, the way people work together is readily changed in order to improve performance.
51. The methods used by this organization to get the job done are often discussed.
52. There are regular discussions as to whether people in the organization are working effectively together.
53. In this organization, objectives are modified in light of changing circumstances.
54. In this organization, time is taken to review organizational objectives.
CLARITY OF ORGANIZATIONAL GOALS (Rational Goal)
55. People have a good understanding of what the organization is trying to do.
56. The future direction of the organization is clearly communicated to everyone.
57. People aren't clear about the aims of the organization.
58. Everyone who works here is well aware of the long-term plans and direction of the organization.
59. There is a strong sense of where the organization is going.
EFFICIENCY (Rational Goal)
60. Time and money could be saved if work were better organized.
61. Things could be done much more efficiently, if people stopped to think.

62. Poor scheduling and planning often results in targets not being met.
63. Productivity could be improved if jobs were organized and planned better.
EFFORT (Human Relations)
64. People here always want to perform to the best of their ability.
65. People are enthusiastic about their work.
66. People here get by with doing as little as possible.
67. People are prepared to make a special effort to do a good job.
68. People here don't put more effort into their work than they have to.
PERFORMANCE FEEDBACK (Rational Goal)
69. People usually receive feedback on the quality of the work they have done.
70. People don't have any idea how well they are doing their job.
71. In general, it is hard for someone to measure the quality of their performance.
72. People's performance is measured on a regular basis.
73. The way people do their jobs is rarely assessed.
PRESSURE TO PRODUCE (Rational Goal)
74. People are expected to do too much in a day.
75. In general, peoples' workloads are not particularly demanding.
76. Management require people to work extremely hard.
77. People here are under pressure to meet targets.
78. The pace of work here is pretty relaxed.
QUALITY (Rational Goal)
79. This organization is always looking to achieve the highest standards of quality.
80. Quality is taken very seriously here.
81. People believe the organization's success demands on high-quality work.
82. This organization does not have much of a reputation for top-quality products.

Another instrument to be considered is Warr, Cook, and Wall's (1979) Global Job Satisfaction (GJS), which measures job satisfaction, or the positive emotional state regarding one's job (Seashore, Lawler, Mirvis, and Cammann, 1983). The GJS has no restrictions and is freely available for use. It has been used in many industries, as both a single composite index and using separate indices, since the instrument was designed to measure both intrinsic and extrinsic job satisfaction, which are psychometrically distinguishable. The composite alpha score ranged from .80 to .91, intrinsic job satisfaction from .84 to .88, and extrinsic scored .76 (Fields, 2002). It also has predictive, concurrent, and face validity (Fields, 2002).

Global Job Satisfaction Measure (Warr, Cook, and Wall, 1979) can also measure intrinsic (even) and extrinsic satisfaction (odd) separately.

Please respond to the questions by stating your level of satisfaction using the following 7-point Likert scale with 1= "I'm extremely dissatisfied" 2= "I'm very dissatisfied" 3= "I'm moderately dissatisfied" 4="I'm not sure" 5= "I'm moderately satisfied" 6= "I'm very satisfied" and 7= "I'm extremely satisfied"

1. The physical working conditions
2. The freedom to choose your own method of working
3. Your fellow workers
4. The recognition you get for good work
5. Your immediate boss
6. The amount of responsibility you are given
7. Your rate of pay
8. Your opportunity to use your abilities
9. Industrial relations between management and workers in your organization
10. Your chance of promotion
11. The way the organization is managed
12. The attention paid to suggestions you make
13. Your hours of work
14. The amount of variety in your job
15. Your job security

APPENDIX L: MEDIATION MODEL COEFFICIENT SUMMARY TABLE

When testing for mediation of the variables, the null hypothesis is that the indirect effect is 0 (Baron & Kenny, 1986). The future research involves 34 possible hypotheses, involving four calculations for each hypothesis.

H_0	Path c	Path a	Path b	Path c'
1	Autonomy→ Job satisfaction	Autonomy→ Perceived productivity	Perceived productivity→ Job satisfaction	Autonomy and Perceived productivity→ Job satisfaction
2	Integration→ Job satisfaction	Integration→ Perceived productivity	Perceived productivity→ Job satisfaction	Integration and Perceived productivity→ Job satisfaction
3	Involvement→ Job satisfaction	Involvement→ Perceived productivity	Perceived productivity→ Job satisfaction	Involvement and Perceived productivity→ Job satisfaction
4	Supervisory support→ Job satisfaction	Supervisory support→ Perceived productivity	Perceived productivity→ Job satisfaction	Supervisory support and Perceived productivity→ Job satisfaction
5	Training→ Job satisfaction	Training→ Perceived productivity	Perceived productivity→ Job satisfaction	Training and Perceived productivity→ Job satisfaction
6	Welfare→ Job satisfaction	Welfare→ Perceived productivity	Perceived productivity→ Job satisfaction	Welfare and Perceived productivity→ Job satisfaction
7	Formalization→ Job satisfaction	Formalization→ Perceived productivity	Perceived productivity→ Job satisfaction	Formalization and Perceived productivity→ Job satisfaction
8	Tradition→ Job satisfaction	Tradition→ Perceived productivity	Perceived productivity→ Job satisfaction	Tradition and Perceived productivity→ Job satisfaction
9	Innovation & flexibility→ Job satisfaction	Innovation & flexibility→ Perceived productivity	Perceived productivity→ Job satisfaction	Innovation & flexibility and Perceived productivity→ Job satisfaction
10	Outward focus→ Job satisfaction	Outward focus→ Perceived productivity	Perceived productivity→ Job satisfaction	Outward focus and Perceived productivity→ Job satisfaction
11	Reflexivity→ Job satisfaction	Reflexivity→ Perceived productivity	Perceived productivity→ Job satisfaction	Reflexivity and Perceived productivity→ Job satisfaction
12	Clarity of goals→ Job satisfaction	Clarity of goals→ Perceived productivity	Perceived productivity→ Job satisfaction	Clarity of goals and Perceived productivity→ Job satisfaction
13	Efficiency→ Job satisfaction	Efficiency→ Perceived productivity	Perceived productivity→ Job satisfaction	Efficiency and Perceived productivity→ Job satisfaction
14	Effort→ Job satisfaction	Effort→ Perceived productivity	Perceived productivity→ Job satisfaction	Effort and Perceived productivity→

				Job satisfaction
15	Performance feedback→ Job satisfaction	Performance feedback→ Perceived productivity	Perceived productivity→ Job satisfaction	Performance feedback and Perceived productivity→ Job satisfaction
16	Pressure to produce→ Job satisfaction	Pressure to produce→ Perceived productivity	Perceived productivity→ Job satisfaction	Pressure to produce and Perceived productivity→ Job satisfaction
17	Quality→ Job satisfaction	Quality→ Perceived productivity	Perceived productivity→ Job satisfaction	Quality and Perceived productivity→ Job satisfaction
18	Autonomy→ Affective commitment	Autonomy→ Perceived productivity	Perceived productivity→ Affective commitment	Autonomy and Perceived productivity→ Affective commitment
19	Integration→ Affective commitment	Integration→ Perceived productivity	Perceived productivity→ Affective commitment	Integration and Perceived productivity→ Affective commitment
20	Involvement→ Affective commitment	Involvement→ Perceived productivity	Perceived productivity→ Affective commitment	Involvement and Perceived productivity→ Affective commitment
21	Supervisory support→ Affective commitment	Supervisory support→ Perceived productivity	Perceived productivity→ Affective commitment	Supervisory support and Perceived productivity→ Affective commitment
22	Training→ Affective commitment	Training→ Perceived productivity	Perceived productivity→ Affective commitment	Training and Perceived productivity→ Affective commitment
23	Welfare→ Affective commitment	Welfare→ Perceived productivity	Perceived productivity→ Affective commitment	Welfare and Perceived productivity→ Affective commitment
24	Formalization→ Affective commitment	Formalization→ Perceived productivity	Perceived productivity→ Affective commitment	Formalization and Perceived productivity→ Affective commitment
25	Tradition→ Affective commitment	Tradition→ Perceived productivity	Perceived productivity→ Affective commitment	Tradition and Perceived productivity→ Affective commitment
26	Innovation & flexibility→ Affective commitment	Innovation & flexibility→ Perceived productivity	Perceived productivity→ Affective commitment	Innovation & flexibility and Perceived productivity→ Affective commitment
27	Outward focus→ Affective commitment	Outward focus→ Perceived productivity	Perceived productivity→ Affective commitment	Outward focus and Perceived productivity→ Affective commitment
28	Reflexivity→ Affective commitment	Reflexivity→ Perceived productivity	Perceived productivity→ Affective commitment	Reflexivity and Perceived productivity→ Affective commitment
29	Clarity of goals→ Affective commitment	Clarity of goals→ Perceived productivity	Perceived productivity→ Affective commitment	Clarity of goals and Perceived productivity→ Affective commitment
30	Efficiency→ Affective commitment	Efficiency→ Perceived productivity	Perceived productivity→ Affective commitment	Efficiency and Perceived productivity→ Affective commitment
31	Effort→ Affective commitment	Effort→ Perceived productivity	Perceived productivity→ Affective commitment	Effort and Perceived productivity→ Affective commitment
32	Performance	Performance feedback→	Perceived productivity→	Performance feedback and

	feedback→ Affective commitment	Perceived productivity	Affective commitment	Perceived productivity→ Affective commitment
33	Pressure to produce→ Affective commitment	Pressure to produce→ Perceived productivity	Perceived productivity→ Affective commitment	Pressure to produce and Perceived productivity→ Affective commitment
34	Quality→Affective commitment	Quality→ Perceived productivity	Perceived productivity→ Affective commitment	Quality and Perceived productivity→ Affective commitment

APPENDIX M: POSSIBLE FUTURE RESEARCH HYPOTHESES FOR ORGANIZATIONAL CLIMATE VERSUS PERCEIVED PRODUCTIVITY

The following are possible relationships to test using the Organizational Climate Measure (Patterson et al., 2004; 2005) and the General Measure of Perceived Productivity developed in this dissertation.

Autonomy versus perceived productivity. "Autonomy" refers to the extent that jobs are designed in ways which give employees wide scope to enact work.

Integration versus perceived productivity. "Integration" refers to the extent of interdepartmental trust and cooperation.

Involvement versus perceived productivity. "Involvement" refers to the extent of employee influence on decision-making.

Supervisory support versus perceived productivity. "Supervisory support" refers to the extent to which employees experience support and understanding from their immediate supervisor.

Training versus perceived productivity. "Training" refers to the extent to which an organization is concerned with developing employee skills.

Welfare versus perceived productivity. "Welfare" refers to the extent to which an organization cares about its employees.

Formalization versus perceived productivity. "Formalization" refers to the extent to which an organization is concerned with formal rules and procedures.

Tradition versus perceived productivity. "Tradition" refers to the extent to which established ways of doing things are valued.

Innovation and flexibility versus perceived productivity. "Innovation and flexibility" refers to the extent of encouragement and support for new ideas and innovative approaches, and an orientation toward adaptation

Outward focus versus perceived productivity. An organization with an outward focus is one that is responsive to the needs of the customer and the marketplace in general.

Reflexivity versus perceived productivity. "Reflexivity" refers to the extent to which an organization is concerned with reviewing and reflecting upon objectives, strategies, and work processes, to adapt to the wider environment.

Clarity of organizational goals versus perceived productivity. The extent to which an organization is concerned with clearly defining the goals of the organization results here.

Efficiency versus perceived productivity. Efficiency pertains to the degree of importance placed on employee efficiency and productivity at work.

Effort versus perceived productivity. The measurement of effort provides a value for how hard people in organizations work towards achieving goals.

Performance feedback versus perceived productivity. "Performance feedback" refers to the extent to which an organization provides measurement and feedback of job performance.

Pressure to produce versus perceived productivity. "Pressure to produce" refers to the extent of pressure for employees to meet targets.

Quality versus perceived productivity. "Quality" refers to the emphasis given to quality procedures.

APPENDIX N: ADDITIONAL FINDINGS

The original purpose of research was to explore relationships: the relationship between organizational climate (the independent variable) and affective commitment (the dependent variable), the relationship between organizational climate (the independent variable) and perceived productivity (the moderator variable), and the relationship between perceived productivity (the moderator variable) and affective commitment (the dependent variable).

- RQ: What is the relationship between each organizational climate and affective commitment?

This research question involved tests to determine the correlation between the climate dimensions versus the affective commitment. The purpose of this research question is to explore the potential relationships of organizational climate dimensions that demonstrate predictability with respect to affective commitment. Although some researchers have previously explored the relationship between organizational climate and commitment, this study focuses on affective commitment, arguably the most important form of commitment because employers view it as the most desirable (Krishna, 2008). This research study offers additional support with a different research design, as well as a different cross-section sample population.

APPENDIX O: SURVEY MONKEY IRB RELEASE

SurveyMonkey Inc.
www.surveymonkey.com

For questions, visit our Help Center
help.surveymonkey.com

Re: Permission to Conduct Research Using SurveyMonkey

To whom it may concern:

This letter is being produced in response to a request by a student at your institution who wishes to conduct a survey using SurveyMonkey in order to support their research. The student has indicated that they require a letter from SurveyMonkey granting them permission to do this. Please accept this letter as evidence of such permission. Students are permitted to conduct research via the SurveyMonkey platform provided that they abide by our Terms of Use, a copy of which is available on our website.

SurveyMonkey is a self-serve survey platform on which our users can, by themselves, create, deploy and analyze surveys through an online interface. We have users in many different industries who use surveys for many different purposes. One of our most common use cases is students and other types of researchers using our online tools to conduct academic research.

If you have any questions about this letter, please contact us through our Help Center at help.surveymonkey.com.

Sincerely,

SurveyMonkey Inc.

APPENDIX P: ALTERNATIVE EXPLORATORY FACTOR ANALYSIS SCENARIOS

The following is an alternative EFA scenario. Even without doing a full EFA procedure, it is apparent that a very similar structure emerges with the principle axis factoring (common factor) technique. The same factor "themes" previously identified when interpreting the results of the principle components analysis remain.

Communalities

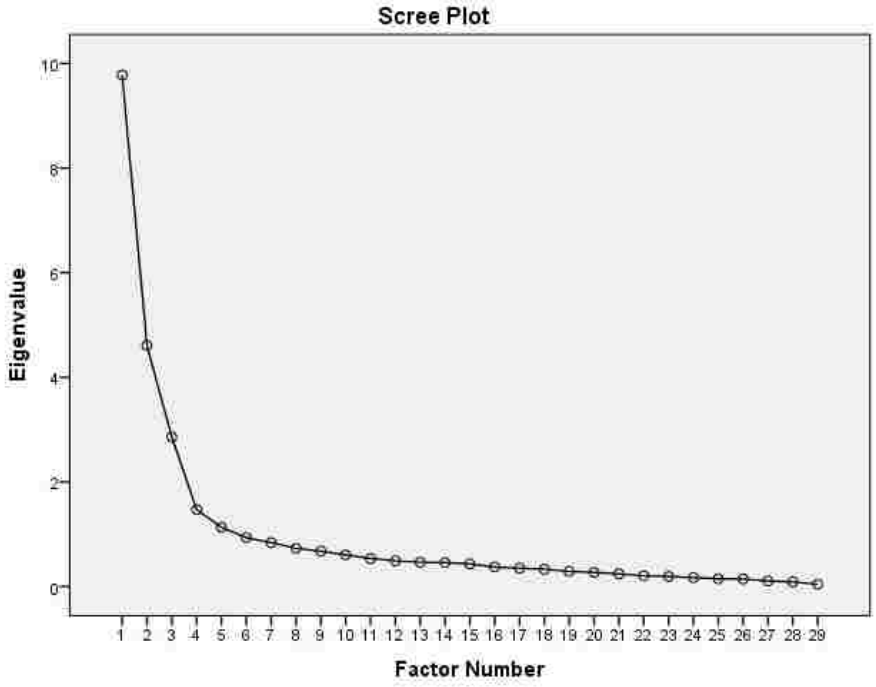
	Initial	Extraction
q0001_0001	.758	.727
q0002_0001	.728	.619
q0003_0001	.624	.546
q0004_0001	.624	.550
q0005_0001	.655	.607
q0006_0001	.687	.592
q0007_0001	.810	.779
q0008_0001	.628	.503
q0009_0001	.803	.676
q0010_0001	.662	.502
q0011_0001	.611	.559
q0012_0001	.584	.561
q0013_0001	.650	.533
q0014_0001	.511	.427
q0015_0001	.722	.827
q0016_0001	.644	.517
q0017_0001	.688	.651
q0018_0001	.690	.662
q0019_0001	.727	.651
q0020_0001	.735	.695
q0021_0001	.764	.668
q0022_0001	.808	.608
q0023_0001	.678	.656
q0024_0001	.891	.665
q0025_0001	.912	.734
q0026_0001	.712	.578
q0027_0001	.712	.674
q0028_0001	.589	.555
q0029_0001	.714	.668

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.779	33.720	33.720	9.412	32.454	32.454	5.381	18.555	18.555
2	4.609	15.894	49.614	4.223	14.562	47.016	4.288	14.787	33.342
3	2.860	9.863	59.477	2.519	8.687	55.703	3.420	11.792	45.134
4	1.470	5.070	64.547	1.083	3.733	59.436	2.866	9.881	55.015
5	1.133	3.907	68.454	.753	2.597	62.033	2.035	7.018	62.033
6	.935	3.223	71.677						
7	.840	2.898	74.575						
8	.731	2.520	77.095						
9	.677	2.335	79.430						
10	.606	2.091	81.521						
11	.537	1.850	83.371						
12	.492	1.697	85.068						
13	.465	1.604	86.672						
14	.460	1.585	88.256						
15	.434	1.496	89.753						
16	.374	1.288	91.041						
17	.352	1.215	92.255						
18	.332	1.145	93.400						
19	.291	1.003	94.403						
20	.271	.934	95.337						
21	.243	.837	96.174						
22	.206	.709	96.883						
23	.194	.668	97.552						
24	.173	.596	98.148						
25	.150	.516	98.664						
26	.146	.503	99.167						
27	.107	.370	99.538						
28	.089	.307	99.844						
29	.045	.156	100.000						

Extraction Method: Principal Axis Factoring.


Scree Plot
Eigenvalue
10
8
6
4
2
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
Factor Number

Factor Matrix[a]

	Factor				
	1	2	3	4	5
q0023_0001	.715				
q0029_0001	.707				
q0021_0001	.683				
q0027_0001	.675				
q0020_0001	.661		-.489		
q0025_0001	.659		.403		
q0002_0001	.654				
q0028_0001	.645				
q0011_0001	.643				
q0006_0001	.642				
q0009_0001	.639				
q0005_0001	.629				
q0022_0001	.617				
q0008_0001	.608				
q0024_0001	.607		.407		
q0007_0001	.584		.453		
q0001_0001	.567		-.517		
q0010_0001	.538	.401			
q0003_0001	.485				
q0015_0001	.400	.627			
q0019_0001	.524	.580			
q0017_0001	.504	.571			
q0013_0001		.567			
q0016_0001	.417	.542			
q0014_0001		.535			
q0018_0001	.492	.522			
q0026_0001	.479	.522			
q0004_0001	.462	.514			
q0012_0001		.494			

Extraction Method: Principal Axis Factoring.

a. 5 factors extracted. 9 iterations required.

Rotated Factor Matrix[a]

	Factor				
	1	2	3	4	5
q0007_0001	.876				
q0025_0001	.830				
q0024_0001	.786				
q0009_0001	.767				
q0006_0001	.711				
q0011_0001	.663				
q0029_0001	.634				.429
q0005_0001	.622				
q0001_0001		.814			
q0020_0001		.761			
q0003_0001		.708			
q0023_0001		.690			
q0002_0001		.686			
q0022_0001		.580			.487
q0021_0001		.545			.538
q0010_0001		.425			
q0018_0001			.761		
q0017_0001			.727		
q0012_0001			.701		
q0019_0001			.687		
q0004_0001			.602		
q0015_0001				.862	
q0013_0001				.629	
q0014_0001				.617	
q0026_0001				.614	
q0016_0001			.450	.513	
q0027_0001	.543				.575
q0028_0001					.516
q0008_0001	.421				.512

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Transformation Matrix

Factor	1	2	3	4	5
1	.616	.538	.383	.251	.348
2	-.449	-.129	.620	.616	-.131
3	.601	-.717	-.064	.326	-.120
4	.092	.424	-.417	.432	-.672
5	-.221	-.009	-.540	.514	.629

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Score Coefficient Matrix

	Factor				
	1	2	3	4	5
q0001_0001	-.011	.366	-.001	-.153	-.215
q0002_0001	.004	.109	-.045	.049	.011
q0003_0001	-.002	.154	-.071	.088	-.127
q0004_0001	-.044	.038	.154	-.037	-.053
q0005_0001	.091	.084	-.095	.119	-.144
q0006_0001	.086	-.009	.034	.000	-.061
q0007_0001	.382	-.070	.135	-.202	-.277
q0008_0001	-.013	-.030	-.054	.064	.187
q0009_0001	.090	-.052	-.050	.009	.142
q0010_0001	-.046	.091	.035	.030	-.009
q0011_0001	.092	-.016	.000	-.014	.037
q0012_0001	.008	-.113	.236	-.065	.018
q0013_0001	.011	-.029	.006	.130	-.026
q0014_0001	-.004	-.001	-.029	.089	.002
q0015_0001	-.024	-.014	-.208	.676	.040
q0016_0001	-.017	.012	.058	.022	.068
q0017_0001	.028	-.047	.274	-.063	-.032
q0018_0001	-.009	.007	.303	-.100	-.120
q0019_0001	-.035	-.030	.202	.018	.032
q0020_0001	-.049	.244	.008	-.024	-.013
q0021_0001	-.080	.109	-.006	-.101	.268
q0022_0001	-.042	.023	-.067	.105	.210
q0023_0001	-.008	.157	-.009	.051	.014
q0024_0001	.035	.017	-.071	.026	.002
q0025_0001	.320	-.054	-.032	.050	-.166
q0026_0001	.038	.023	.032	.097	-.070
q0027_0001	.063	-.134	.022	.010	.318
q0028_0001	-.023	.007	-.014	-.051	.198
q0029_0001	.088	-.026	.046	-.084	.141

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.
Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1	2	3	4	5
1	.923	.023	-.007	.013	.048
2	.023	.884	.038	-.019	.054
3	-.007	.038	.826	.091	.038
4	.013	-.019	.091	.858	-.017
5	.048	.054	.038	-.017	.752

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.
Factor Scores Method: Regression.

VITA

Research Interests

Organizational culture and climate, organizational behavior and productivity, entrepreneurship, complex adaptive systems, systems theory, cybernetics, governance, sustainability

Education

Old Dominion University, Norfolk, VA
Doctor of Philosophy in Engineering Management, May 2017
Dissertation: *An Investigation of Perceived Productivity and its Influence on the Relationship between Organizational Climate and Affective Commitment*

Master of Engineering Management, August 2013
Master's Project: *Development of a Mobile Application for Project Management Institute's PMP Exam Study and Practice*

Bachelor of Science in Applied Mathematics, December 2011

Teaching Appointments

Graduate Instructor | August 2015 – Present
Agile Project Management (Graduate/Undergraduate), Engineering Ethics (Undergraduate), Decision Making Techniques (Undergraduate)

Graduate Teaching Assistant | January 2012 – August 2015
Engineering Ethics (Undergraduate), Agile Project Management (Graduate), Entrepreneurship (Graduate), Systems Analysis (Graduate), Quality Systems Design (Graduate), Project Management (Undergraduate and Graduate), Operations Research (Graduate), Introduction to Engineering Management (Undergraduate)

Non-Academic Work

Beluga Enterprises, LLC. Norfolk, VA | 2014-2016
Owner, Project Manager, Front End App Developer

Southside Utilities, Inc. Virginia Beach, VA | 2007 - 2009
Accounts Receivable, Sales Manager

Professional Affiliations

Phi Kappa Phi Honor Society
Epsilon Mu Eta – Engineering Management Honor Society
American Society of Naval Engineers