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AN EXAMINATION OF THE RELATIONSHIP BETWEEN THE ORGANIZATIONAL COMMUNICATION PROCESS, EMPLOYEE WORK ENGAGEMENT, AND JOB PERFORMANCE IN A HIGH-SPEED, HIGH-VOLUME MANUFACTURING OPERATION

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ABSTRACT

This study looked for significant relationships between employee communication satisfaction and employee work engagement, employee work engagement and job performance, and employee communication satisfaction and job performance at a manufacturing facility in the southeast United States. The question of significant differences in the levels of employee communication satisfaction, employee work engagement, and job performance was also explored. Surveys were used to establish measures of communication satisfaction and work engagement at both the individual and team levels of five similar work teams. Job performance was measured at the team level using three-week average first-pass yield scores from the product testing areas. The data was analyzed using Pearson's *r* correlation coefficient testing, simple linear regression, multiple linear regression, and multivariate analysis of variance. The analyses found strong evidence of predictive relationships between levels of communication satisfaction and work engagement. However, the sample size of only five work teams appears to have affected the reliability of any conclusions regarding the possibility of significant relationships between engagement and job performance or communication satisfaction and job performance. The job performance sample size of only five work teams appears to have similarly affected analyses of any differences in the levels of employee communication satisfaction, employee work engagement, and job performance. Further research, using a larger sample size for three-week average first-pass yield scores, or some other measure of job performance, is recommended.

ACKNOWLDEGEMENTS

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CHAPTER I

INTRODUCTION

Purpose of the Study

The purpose of this study was to explore the relationship between communication satisfaction, work engagement, and job performance among employees at an appliance manufacturing facility in the southeast United States. The study measured two traits, communication satisfaction and individual employee work engagement, among a subset of employees in a high-speed, high-volume manufacturing operation. The intent was to determine if communication satisfaction and individual employee work engagement may be associated with job performance.

At the time of this study, appliance-manufacturing organizations, such as the one focused on in this study (hereafter referred to as the Company), are facing many challenges. Some of the challenges include uncertain demands in established and emerging markets, intense competition from both new and established global competitors, excess government regulation and taxation, and attracting and keeping qualified employees (Bakker, Albrecht, & Leiter, 2010; Hoske, 2012; McDonald, 2014; "Whirlpool Corporation Reports Third-Quarter 2011 Results," 2011). For many manufacturers, the need to fully utilize every competitive tool available is seen as critical for survival in the marketplace (Wilson, 2010; Womack, Jones, & Roos, 1991). Manufacturers are adapting by developing new strategies, formulating nontraditional ways of measuring their

operations, and affecting changes they hope will ensure their successful long-term survival in the increasingly competitive global economy (Lucas & Kirillova, 2011).

Rationale of the Study

Representing one perspective on communication in organizations, Downs and Adrian (2004) note that the communication process within organizations is frequently the subject of oversimplification by management who may perceive internal communication as "a mere message exchange" (p. 3). In contrast, other managers grossly misconceive internal communication as a manipulative tool capable of compelling the receiver to behave as desired by the communicator (Downs & Adrian, 2004).

Carrière and Bourque (2009) characterize the process of internal organizational communication as a complex mix of formal and informal activities that disseminate information in all directions within the organization. Consisting of the full spectrum of communication activities, internal communication can be initiated by any member of the organization. According to Carrière and Bourque (2009), it is management's responsibility to ensure the effectiveness and efficiency of the organization's communication systems so that all members of the organization receive the information they need to function in a timely and relevant fashion.

In the view of Downs and Adrian (2004), managers must devote considerable resources to the study of communications within their organizations. Understanding communication within the organization is necessary if managers are to fully understand the impact of communications on their operations (Downs & Adrian, 2004). With a greater understanding of how communication is used and received within their organizations, according to Downs and

Adrian (2004), managers are better able to utilize communication systems to their full effect in the improvement of organizational performance.

One widely used method of determining the impact of organizational communication practices on organizational operations and performance is the assessment of communication satisfaction (Downs & Adrian, 2004; Meintjes & Steyn, 2006). Employee attitudes toward organizational communication processes are often used as the measure of effectiveness in these types of assessments (Downs & Adrian, 2004; Gray & Laidlaw, 2004; Gregson, 1991; Zwijze-Koning & de Jong, 2007). Carrière and Bourque (2009) describe the relationship between internal communication practices and communication satisfaction as one of antecedent and consequence, where communication practices are the antecedent and communication satisfaction is the consequence.

According to Welch and Jackson (2007), the most effective type of internal communication is formulated by the leaders of an organization as a focused strategy with specific aims. They view effective internal communication as "communication between an organization's strategic managers and its internal stakeholders, designed to promote commitment to the organization, a sense of belonging to it, awareness of its changing environment, and understanding of its evolving aims" (Welch & Jackson, 2007, p. 193). Welch and Jackson (2007) conceptualize this type of communication as internal corporate communication and see it as an enabler for strategic managers to engage employees, as well as achieve organizational objectives.

Bakker, Schaufeli, Leiter, and Taris (2008), suggest that organizations may achieve competitive advantage by focusing on the engagement of their employees. After surveying the findings from engagement research studies, the researchers conclude that there is a link between

work engagement and performance (Bakker et al., 2008). They contend that "employees who feel vital and strong, and who are enthusiastic about their work, show better in-role and extra-role performance. As a consequence, engaged workers realize better financial results, and have more satisfied clients and customers" (Bakker et al., 2008, p. 194). Furthermore, in a study of 245 firefighters and their supervisors, Rich, Lepine, and Crawford (2010) concluded that there was a strong relation between engagement and performance. Their survey results showed a tendency among employees who reported higher levels of engagement with their work to receive higher supervisory ratings on both task performance and organizational citizenship behaviors (Rich et al., 2010).

Two likely predictors of engagement, job satisfaction (Saks, 2006) and organizational identity (Macey & Schneider, 2008), have been positively associated with organizational communication (De Nobile & McCormick, 2008; Downs & Adrian, 2004; Gossett, 2002; Kumar & Giri, 2009). Job satisfaction and organizational identity have also been shown to be influenced by working in teams (Foote & Thomas Li-Ping, 2008; Jewson, 2007; Mohr & Zoghi, 2008). Bakker et al. (2008) defined the combined efforts of individual employees as organizational performance and suggested "that the crossover of engagement among members of the same work team increases performance" (p. 194). Increased performance was one of the Company's goals when, in the early 1990s, it implemented an organizational structure of work teams across its production operations (Reece, 2011b). Loosely patterned on the concept of high involvement work teams, as described by Lawler, Mohrman, and Ledford (1992), the practice grouped employees together according to their location and job tasks. Teams were provided with performance expectations and resources and were allowed to proceed with minimal management interference. The Company's work teams were required to hold formal weekly

meetings to discuss their goals and objectives, and the review of internal communications prepared specifically for dissemination to the work teams was a required practice at each weekly meeting (Baker, 2015).

According to the Company's manufacturing quality leader, Roger Baker (2015), the work team structure remains and scheduled weekly work team meetings remain a regular part of the Company's operational routine. Providing individual work teams with specific goals and objectives, however, is no longer practiced. Regular tracking of work team performance has evolved into the monitoring of team-specific performance data from the product quality testing areas or from the downstream customers of the facility's internal fabrication and finishing processes (Baker, 2015).

A major component of the Company's communication processes and a key feature of its weekly team meeting routine, is a review by the team leader of prepared communications from management in the form of a weekly team communication packet (Baker, 2015). The rationale of this study was to determine if the Company's employee communication processes influence the work engagement of employees and if those influences are associated with organizational performance. Such a determination may help the Company's leaders identify those practices in the employee communication processes that are value-added activities and those that are not. Value-added is a term used in manufacturing to indicate activities that add to the form, fit, or function of a product and/or something for which a customer is willing to pay (Wilson, 2010). This study also attempted to identify organizational policies and processes that have the potential of being value-added or non-value-added with respect to the work engagement of employees and the promotion of improved organizational performance.

Conceptual Framework of the Study

The study was conducted in an operational manufacturing environment and sought to answer specific questions related to the Company's employee communication processes, as well as its relationship to employee work engagement and performance, relative to the organization's stated goals. The conceptual approach of this study was based on Welch's (2011) model of employee engagement and internal corporate communication (see Figure 1).

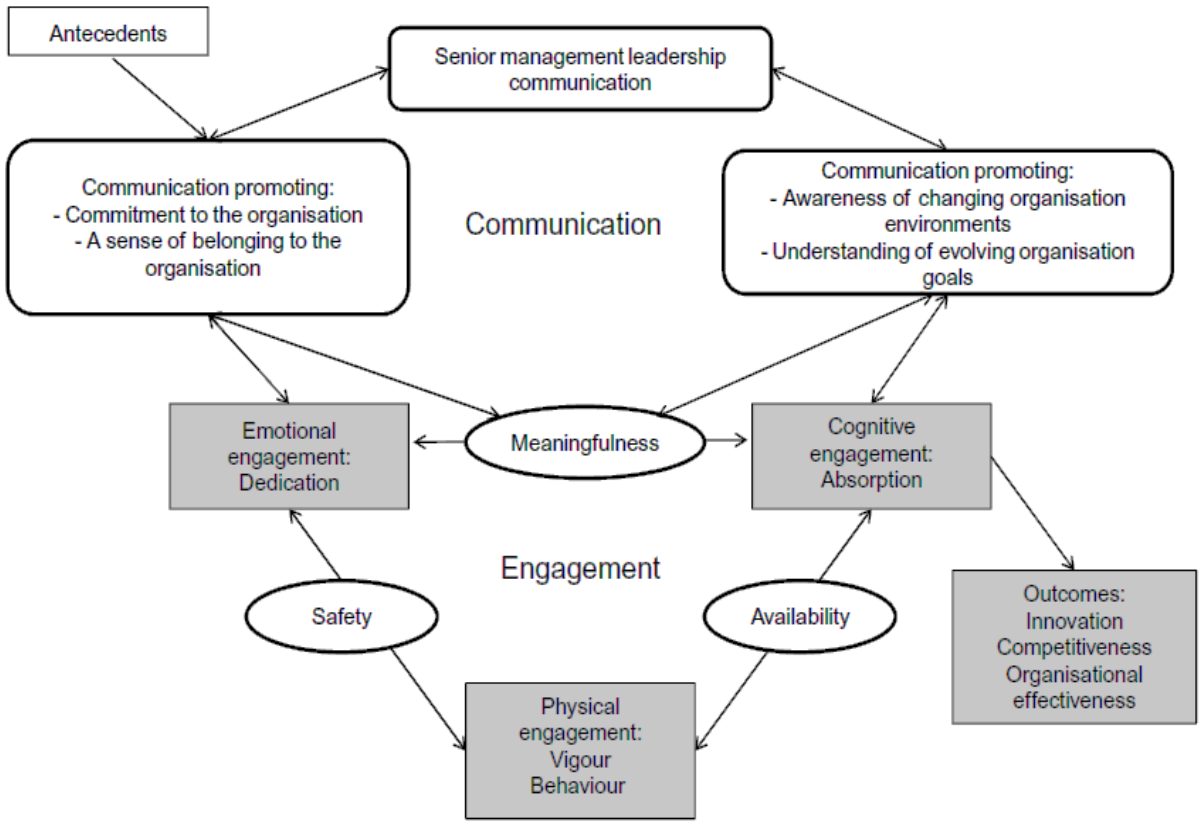

Figure 1 Welch's (2011) conceptual model of employee engagement and internal corporate communication

Welch's (2011) model illustrates engagement as the interplay of the two most widely referenced views of engagement (Shuck & Wollard, 2010): the view described by Kahn (1990) and that described by Schaufeli, Salanova, González-romá, and Bakker (2002). As conceived by Kahn (1990), employee engagement manifests in the emotional dimension, the cognitive dimension, and the physical dimension. In the view of Schaufeli et al. (2002), employee engagement is observed in the varying levels of three individual characteristics: dedication, absorption, and vigor. In the model, dedication is associated with emotional engagement, absorption with cognitive engagement, and vigor with physical engagement (Welch, 2011). Integrated into this view of engagement are three necessary psychological conditions identified by Kahn (1990): safety, which affects both emotional and physical engagement; meaningfulness, which is associated with both emotional and cognitive engagement; and availability, which relates to both cognitive and physical engagement.

Welch's (2011) model conceptualizes senior management leadership communication as directly affecting aspects of the engagement model. Leadership is depicted as directing communication promoting the antecedent engagement variables of organizational commitment and belonging (Meyer, Gagne, & Parfyonova, 2010) to influence emotional engagement and meaningfulness. Communication promoting the antecedents awareness of the organizational environment and understanding of the organization's goals (Bindl & Parker, 2010) are meant to influence cognitive engagement and meaningfulness.. For Welch (2011), internal communication conveys the values of the organization to all employees and involves them directly with the organization's goals.

Welch's (2011) model shows the organizational outcomes of employee engagement to be innovation, competitiveness, and organizational effectiveness. Some researchers (Christian et

al., 2011; Kahn, 1990; Macey & Schneider, 2008) suggest that improved levels of employee job performance may also be a positive organizational outcome related to employee engagement. In line with the Welch (2011) model, the study included job performance as one of the outcomes of engagement as it may be influenced by organizational communication.

Research Questions

The principle aim of the study was to explore the relationships between employee satisfaction with the Company's internal employee communications processes, employee engagement levels, and job performance. Thus, the following research questions generated the attendant research hypotheses:

R_1: Is there a significant relationship between employee communication satisfaction and employee work engagement in the workplace?

H_1: There is a significant relationship between employee communication satisfaction and employee work engagement.

R_2: Is there a significant relationship between employee work engagement and job performance?

H_2: There is a significant relationship between employee work engagement and job performance.

R_3: Is there a significant relationship between employee communication satisfaction and job performance?

H_3: There is a significant relationship between employee communication satisfaction and job performance.

R_4: Is there a significant difference in levels of employee communication satisfaction, employee work engagement, and job performance between sample populations in the workplace?

H_4: There is a significant difference in levels of employee communication satisfaction, employee work engagement, and job performance between sample populations in the workplace.

Significance of the Study

This study explored the relationships between communication satisfaction, employee work engagement, and job performance. In this regard, the study will likely help meet a need for research into organization-level interventions to promote individual employee work engagement (Bakker et al., 2010). It is further anticipated that the results of the study may suggest additional avenues for research involving the effects of internal communication and employee work engagement on employee performance in manufacturing operations.

Limitations of the Study

The limitations of the study include:

a. Researcher bias. For nearly two decades the investigating researcher has had responsibility for the Company's employee communications including the development and distribution of the Company's weekly communication and information packet for employees.

b. The external validity question of selection-treatment interaction. The nonrandom selection of participants the researcher proposes might limit the generalizability of the study.
c. The external validity question of reactive arrangements. The participants may act in ways different from their normal behavior because they know they are being studied.
d. Variations in the presentation of Company communications between teams. As previously described, team leaders review prepared communications from management during weekly team meetings (Baker, 2015). These presentations will vary from Team Leader to Team Leader. Although the Modified Communication Satisfaction Questionnaire described in Chapter 3 of this paper attempts to determine satisfaction with a variety of communication processes and sources, Team Leader presentation may influence individual levels of communication satisfaction.
e. Other communication efforts that are not accounted for in this study, but may have influenced the individual communication satisfaction scores of some participants.

Delimitations of the Study

The Company's operations are large and complex. The operation employs approximately 1,600 people in two major components: manufacturing and engineering. The manufacturing component consists of two primary operations: the assembly operation and the fabrication and finishing operation. At this writing, more than a dozen separate processes comprise the fabrication and finishing processes. A similar number of individual processes comprise the

assembly operation, which employs the majority of hourly operators at the Company. Together, the assembly processes produce more than 250 varieties of gas and electric consumer-grade kitchen appliances on five basic design platforms.

To keep the study manageable, the following delimitations were imposed:

a. The sampling frame was restricted to members of five work teams on three separate assembly lines. Each team is responsible for the control panel assembly or radiant cooktop assembly on their assembly line's basic design platform.
b. The job performance measures were restricted to data derived from the product testing areas of the assembly lines that can be directly traced back to the subject work teams.

Definition of Terms

Like many other industrial operations, the Company and the Corporation have their own terminology to describe their operational policies and practices. While the terms that make up this jargon would be familiar to employees in any manufacturing or industrial setting, many are unique to the operations of the Company and the Corporation. To facilitate the flow of the text of this proposal and assist the understanding of the material to follow, definitions for the following terms, as derived from the Company's internal communications and daily operations, are provided. In the interests of conserving space within this paper and the time of the reader, explanations of the more specific terms will be deferred until they are introduced in the narrative, when they will be explained in context.

Assembly – The largest departmental operational unit within the Company. Workers in the assembly department build and package the Company's products for delivery (Internal company communications).

Area Leader (AL) – The hourly employee in charge of the operations and employees in a specific assembly, fabrication, finishing, or support process. ALs report directly to a Business Leader (Internal company communications).

Business Support Team (BST) – The Company's primary managerial unit. The BST is composed of Operations Leaders and other senior staff members, all of whom report directly to the Company's Plant Leader (Internal company communications).

Business Leader (BL) – The salaried employee in charge of the operations and employees in a specific assembly, fabrication, finishing, or support process (Internal company communications).

Employee Communication Satisfaction – A measure of an employee's "affective response to the fulfillment of expectation-type standards" (Hecht, 1978, p. 350) with regard to his/her organization's internal communication processes.

Engagement – The physical and psychological state associated with an individual's role performance (Kahn, 1990; Saks, 2006; Schaufeli et al., 2002). The term engagement is often used to describe various perspectives on engagement such as work engagement or organizational engagement (Christian et al., 2011; Saks, 2006; Shuck, 2011). These various perspectives will be described in more detail in the forthcoming literature review.

Fabrication – A departmental operational unit within the Company concerned with the application of mechanical power presses in the production of raw sheet metal parts for use in the assembly operation (Internal company communications).

Finishing – A departmental operational unit within the Company concerned with the surface preparation of many raw parts for use in the assembly operation (Internal company communications).

Operations Leader (OL) – The salaried employee responsible for the operations and employees of an entire operational function such as assembly or fabrication (Internal company communications).

Operator – The term used to signify a single individual working in an hourly-wage job on a work team (Internal company communications).

Packet – The term used to refer to the weekly communication that is prepared, published, and distributed through the teams as the primary vehicle of formal organizational communication (Internal company communications).

Plant Leader (PL) – The senior staff member of the Company. The PL is responsible for the entire operation of the Company and answers directly to the Company's parent corporation (Internal company communications).

Support Team – The general term used to refer to any of several departmental operational units that support the assembly operations. These may include engineering, shipping, receiving, maintenance, or facilities (Internal company communications).

Team – The basic organizational unit within the Company, also known as a work team. Teams are arranged in a hierarchical fashion from assembly line or process-specific work teams at one extreme to the BST at the other. Teams are created to support specific business goals and objectives (Internal company communications).

Team Leader (TL) – An hourly employee in charge of a specific work team.

The Company – The term used to refer to the organization that will be the subject of this study.

The Corporation – The parent corporation of the Company.

Value-Added Activity – A term used in manufacturing to indicate activities that add to the form, fit, or function of a product and/or something for which a customer is willing to pay (Wilson, 2010).

Work Engagement – To distinguish it from the term engagement, work engagement is defined as "a relatively enduring state of mind referring to the simultaneous investment of personal energies in the experience or performance of work" (Christian et al., 2011, p. 95).

CHAPTER II

LITERATURE REVIEW

Introduction

The intent of this study was to explore the relationships between an appliance manufacturing operation's employee communications processes, employee work engagement, and employee job performance. The conceptual framework of the study was based on the model proposed by Welch (2011), which illustrates the ways internal organizational communication may influence employee engagement with regard to potential organizational outcomes. This chapter reviews literature relevant to the core components of the Welch (2011) model, specifically communication in organizations as well as employee work engagement and its consequences.

Organizational Communication

The scholarly examination of communication within organizations as a stand-alone field of study is seen by some as having its origins in the 1920s when universities began to offer business and professional speaking courses as an aid for improving communication effectiveness in the workplace (Allen, Tompkins, & Busemeyer, 1996; Baker, 2002). By the mid-1940s and the publication of the 1st edition of Simon's *Administrative Behavior* (Simon, 2013), communication within organizations was coming to be seen as an essential function of effective organizations. Simon (2013) saw communication in organizations to mean "any process

whereby decisional premises are transmitted from one member of an organization to another" (p. 208). Without communication, Simon (2013) says, "there can be no organization, for there is no possibility then of the group influencing the behavior of the individual" (p. 208). According to Heath (1994), organizations are "interpretative, adaptive systems" (p. 26) that survive and thrive through the abilities of their members to make sense of information about themselves and their environment.

To Tompkins (1984), the academic discipline of organizational communication is "the study of sending and receiving messages that create and maintain a system of consciously coordinated activities or forces of two or more persons" (pp. 662-663). For Baker (2002), organizational communication is a field of study that is fragmented and diverse, spanning communication from the macro to the micro levels and from the formal to the informal. In Baker's (2002) view, the study of organizational communication should include examination of both internal and external communication practices and the influences of new technologies on those practices.

Gargiulo (2005) described organizational communication as a practice involving various combinations of targets, channels, and tools. The targets of organizational communication may be internal or external (Gargiulo, 2005). Internal targets, according to Gargiulo's (2005) characterization, are typically the organization's employees. Internally focused organizational communication of this type, in the view of Welch and Jackson (2007), consists of four distinct dimensions: internal line manager communication, internal team peer communication, internal project peer communication, and internal corporate communication. Each dimension of an organization's internally focused communications has its own intents and purposes (Welch & Jackson, 2007). The first dimension, internal line manager communication, as defined by Welch

and Jackson (2007), occurs at every level in an organization. They view it as a predominantly two-way form of communication between managers and their employees, which consists mainly of matters related to the employee's role, appraisals of the employee's performance, and team briefings (Welch & Jackson, 2007).

The second dimension, internal team peer communication, is described as employee-to-employee communication between members of the same team or work group and consists mainly of information relative to team or group activities (Welch & Jackson, 2007). The third dimension, internal project peer communication, is also described as employee-to-employee communication within project groups and consists of information relative to the group's project activities (Welch & Jackson, 2007). The fourth dimension of internal communication is internal corporate communication, which takes place between the organization's top strategic managers and its internal stakeholders (Welch & Jackson, 2007). Internal communication is a predominantly one-way form of communication intended to promote organizational commitment and a sense of belonging among the members of the organization (Welch & Jackson, 2007). Internal communication also promotes awareness of both internal and external change along with an improved understanding of the organization's evolving aims (Welch & Jackson, 2007).

Furthermore, internal corporate communication is the type of organizational communication that the Welch (2011) model conceptualizes as impacting employee engagement by influencing employee attitudes and behavior. According to Gargiulo (2005), internal organizational communication channels may be formal, social, or personal. Examples of formal pathways for company communications include newsletters and policy manuals. Social channels may include vision statements or guiding principles. Together these communication channels are useful as a means for the organization's leaders to inculcate shared values, beliefs, and

attitudes in the organization's members (Gargiulo, 2005). Greenberg and Baron (2011) called the cognitive framework of values, attitudes, and behavioral norms, shared by the members of an organization, the organization's culture. Culture, according to Greenberg and Baron (2011), is established and reinforced by an organization's leaders through formal and informal communication channels. The established culture then serves to provide the members of the organization with a sense of identity, generates commitment to the organization's goals and objectives, and clarifies and reinforces the standards for behavior within the organization (Greenberg & Baron, 2011).

Organizational Communication and Culture

Tsoukas (2011) views organizational communication as the essence of institutional memory. Institutional memory is most often manifested as a combination of codified formal rules or routines, inherent informal understandings and norms, and distributed memories among the members of the group (Tsoukas, 2011). Characterized in this fashion, institutional memory resembles the definition of organizational culture offered by Naranjo-Valencia, Jiménez-Jiménez, and Sanz-Valle (2011): "the values, beliefs and hidden assumptions that organizational members have in common" (p. 58). According to Greenberg and Baron (2011), culture promotes commitment to the organization's mission, encourages organizational identity, and provides clarity to the organization's standards of behavior. Schein (2010) wrote that organizations derive their language and their meaning from their specific culture. Culture, according to Schein (2010), is the foundation of an organization's social order. He defines it as

> a pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. (Schein, 2010, p. 18)

It is the organization's leaders, according to Schein (2010), who determine the organization's culture. In Schein's (2010) view, leadership creates the conditions for the formation of organizational culture through the influence it brings to bear on the behaviors and values of the organization's members. Through culture, leaders embed conscious and unconscious convictions in the members of the organization, which helps to determine the individual patterns of perception, thinking, feeling, and behaving among the organization's members (Schein, 2010). The most critical embedding mechanisms for cultural behaviors, according to Schein (2010), are the things that leaders choose to regularly measure and control. For example, in organizations in which leaders regularly focus on customer satisfaction, employees are likely to view behaviors that lead to customer satisfaction as desirable (Greenberg & Baron, 2011). The implicit messages sent when leaders choose to pay attention to specific behaviors and values communicate to the members of the organization what should be viewed as important (Schein, 2010). The implicit messages also communicate how individuals should behave organizationally (Schein, 2010). As conceptualized by the Welch (2011) model, an organization's leadership may directly affect employee engagement by focusing its internal communication efforts on messages that promote commitment, a sense of belonging, awareness of change, and an understanding of the organization's evolving goals.

Engagement

The term engagement is often used to describe various perspectives on the concept of an individual employee's relationship with his/her work (Christian et al., 2011; Saks, 2006; Shuck, 2011). Kahn (1990) first introduced the concept of employee engagement into the academic literature in the last decade of the 20th century. Initially, it was widely accepted by practitioners,

but was largely ignored by scholars and academics (Christian et al., 2011; Macey & Schneider, 2008; Saks, 2006; Shuck & Wollard, 2010). It would be more than 10 years before the subject would be seriously revisited by Maslach, Schaufeli, and Leiter (2001), who attempted to reshape the definition of the concept (Saks, 2006; Shuck & Wollard, 2010). This would not be the last effort to establish a working definition of engagement by scholars (Shuck & Wollard, 2010). As Christian et al. (2011) note, the history of "engagement research has been plagued by inconsistent construct definitions and operationalizations" (p. 90), contributing to a reluctance on the part of scholars to readily embrace the study of engagement. Several researchers have described this reluctance as being rooted in the concern that the concept is too similar to other constructs and that engagement is nothing more than the repackaging of other motivational concepts (Cole, Walter, Bedeian, & O'Boyle, 2012; Macey & Schneider, 2008; Saks, 2006).

William Kahn (1990) is regarded by many as the first to publish scholarly research on whether individuals are psychologically engaged with their job (Saks, 2006; Schaufeli & Bakker, 2010; Shuck & Wollard, 2010; Welch, 2011). Kahn (1990) introduced the concepts of personal engagement and personal disengagement in work role performance using the results of separate studies of individual job behaviors among a group of summer camp counselors and the members of an architecture firm. Reflecting on this initial research report, Kahn (2010) stated he was seeking to explain why people vary the degrees to which they involve themselves in their work. Kahn (1990) maintained that people need both self-expression and self-employment in their work lives. In his view, individuals who are personally engaged during work-role performance are physically, cognitively, and emotionally employing as well as expressing themselves in their work role; whereas, individuals who are personally disengaged in their role performance have physically, cognitively, and emotionally uncoupled themselves from their work-role performance

(Kahn, 1990). According to the model proposed by Kahn (1990), an individual's decision to be personally engaged or disengaged in his/her work role is shaped by multiple factors, including individual, interpersonal, group, intergroup, and organizational influences. "It is at the swirling intersection of those influences that individuals make choices, at different levels of awareness, to employ and express or withdraw and defend themselves during role performances" (Kahn, 1990, p. 719).

Kahn (1990) suggested three primary psychological conditions that influence an individual's conscious or unconscious decision to engage or disengage: meaningfulness, safety, and availability. Meaningfulness, according to Kahn (1990), is the degree to which the individual feels s/he will achieve a return on the investment of their self in the performance of their role. Safety is the ability to avoid negative social consequences and availability is viewed as the individual's assessment of the amount of physical, emotional, and psychological resources necessary to invest in the performance of the role (Kahn, 1990).

Empirical research (May, Gilson, & Harter, 2004) found support for Kahn's (1990) idea of three primary psychological conditions. In a study involving 213 employees at an insurance firm, May et al. (2004) concluded that "all three psychological conditions are important in determining one's engagement at work" (p. 30). The researchers reported that their surveys showed job enrichment and work role fit to be positively linked to psychological meaningfulness (May et al., 2004). Psychological safety was positively related to rewarding and supportive co-worker and supervisor relations (May et al., 2004). Additionally, the availability of resources was positively related to psychological availability (May et al., 2004).

More than 10 years after Kahn (1990) suggested the concept, Maslach et al. (2001) offered up another definition of employee engagement. Basing their assumptions on a review of

more than 25 years of research into job burnout, Maslach et al. (2001) framed employee engagement as the positive antithesis of job burnout. Defined as a psychological response to chronic interpersonal and emotional stressors on the job, burnout is manifested through the expression of high levels of exhaustion, cynicism, and ineffectiveness (Maslach et al., 2001). Whereas exhaustion, cynicism, and ineffectiveness are indicators of burnout, their opposites can be seen as indicators of engagement: vigor, instead of exhaustion; dedication, instead of cynicism; and absorption, instead of ineffectiveness (Maslach et al., 2001). From this view, Maslach et al. (2001) posited the definition of engagement as "a persistent, positive affective-motivational state of fulfillment in employees that is characterized by vigor, dedication, and absorption" (p. 417). The authors described employees displaying vigor as having high energy and resilience, investing effort in their job, not being easily fatigued, and showing persistence when faced with difficulties. Dedication was manifested in employees through strong involvement and enthusiasm in their work as well as feelings of significance, inspiration, and pride. Absorption was identified in employees who were totally immersed in their work to the point that time passed quickly for them and they felt unable to detach from the job (Maslach et al., 2001).

The conceptualization of engagement as the antithesis of burnout, proposed by Maslach et al. (2001), found support in a later empirical study by Schaufeli and Bakker (2004). They studied the results of surveys given to more than 1,600 employees, at four separate Dutch service organizations, to test a model that presented burnout and engagement as having different predictors and different outcomes (Schaufeli & Bakker, 2004). The researchers concluded that there was a negative relationship between burnout and engagement (Schaufeli & Bakker, 2004). They also identified job demands and a lack of job resources as key predictors of burnout

(Schaufeli & Bakker, 2004). Schaufeli and Bakker (2004) further asserted that available job resources are predictors of engagement, health problems and turnover intention are related to burnout, and engagement is related to turnover intention.

In 2006, González-Romá, Schaufeli, Bakker, and Lloret (2006) published a study supporting the idea put forth by Maslach et al. (2001) that the core dimensions of burnout and engagement are opposites. The researchers analyzed data from two surveys of three separate sample groups consisting of more than 1,000 employees from three Dutch firms (González-Romá et al., 2006). Their finding suggested that emotional exhaustion and cynicism, the two core dimensions of burnout, can indeed be viewed as the opposites of vigor and dedication, two of the core dimensions of engagement (González-Romá et al., 2006).

Saks (2006) further refined the concept of employee engagement by drawing a distinction between job and organization engagement. Relying principally on the descriptions of engagement previously put forth by Kahn (1990) and Maslach et al. (2001), Saks (2006) took the view that job engagement is strictly related to engagement in one's job, whereas organization engagement relates to engagement in one's role within the organization. Saks (2006) defined engagement as "a distinct and unique construct that consists of cognitive, emotional, and behavioral components that are associated with individual role performance" (p. 602). From this definition and from a review of the literature, Saks (2006) developed a model of the antecedents and consequences of employee engagement. He tested his model by surveying 102 long-term employees from several organizations to measure both job engagement and organization engagement (Saks, 2006). The results showed significantly higher scores for job engagement measures as opposed to organization engagement measures (Saks, 2006). Significant differences

were also found between the relationships of job and organization engagement with the antecedents and consequences identified in the model (Saks, 2006).

Saks (2006) drew several conclusions from his research findings. Among them were the assertions that job and organization engagement are derived from different psychological conditions, and that both job and organization engagement can be predicted by a number of factors, including perceived organizational support. Saks (2006) determined that job and organization behavior could be used to predict employee attitudes, intentions, and behaviors. According to Welch (2011), Saks' (2006) work was a primary influence on how she illustrated engagement in her conceptual model of employee engagement and internal corporate communication.

Macey and Schneider (2008) viewed engagement as a complex construct with a variety of antecedents and consequences. Drawing from academic and practitioner literature on the subject, they defined engagement as "a complex nomological network encompassing trait, state, and behavioral constructs, as well as the work and organizational conditions that might facilitate state and behavioral engagement" (Macey & Schneider, 2008, pp. 23-24). The nomological network, in the view of Macey and Schneider (2008), can be found in the complexities of the relationships between the various elements of employee engagement. They conceptualized a framework for understanding the elements of employee engagement that they suggested could be useful to researchers and practitioners alike (Macey & Schneider, 2008). Their framework (see Figure 2) emphasized the interplay between what they described as three separate, distinct, and measurable types of engagement: trait engagement, psychological state engagement, and behavioral engagement (Macey & Schneider, 2008). According to the framework suggested by Macey and Schneider (2008), trait engagement is a disposition, characterized by "positive views

of life and work" (pp. 5-6), reflected in the psychological state engagement. Psychological state engagement is characterized by energy and absorption and is manifested as "satisfaction (affective), involvement, commitment, and empowerment" (Macey & Schneider, 2008, pp. 5-6).

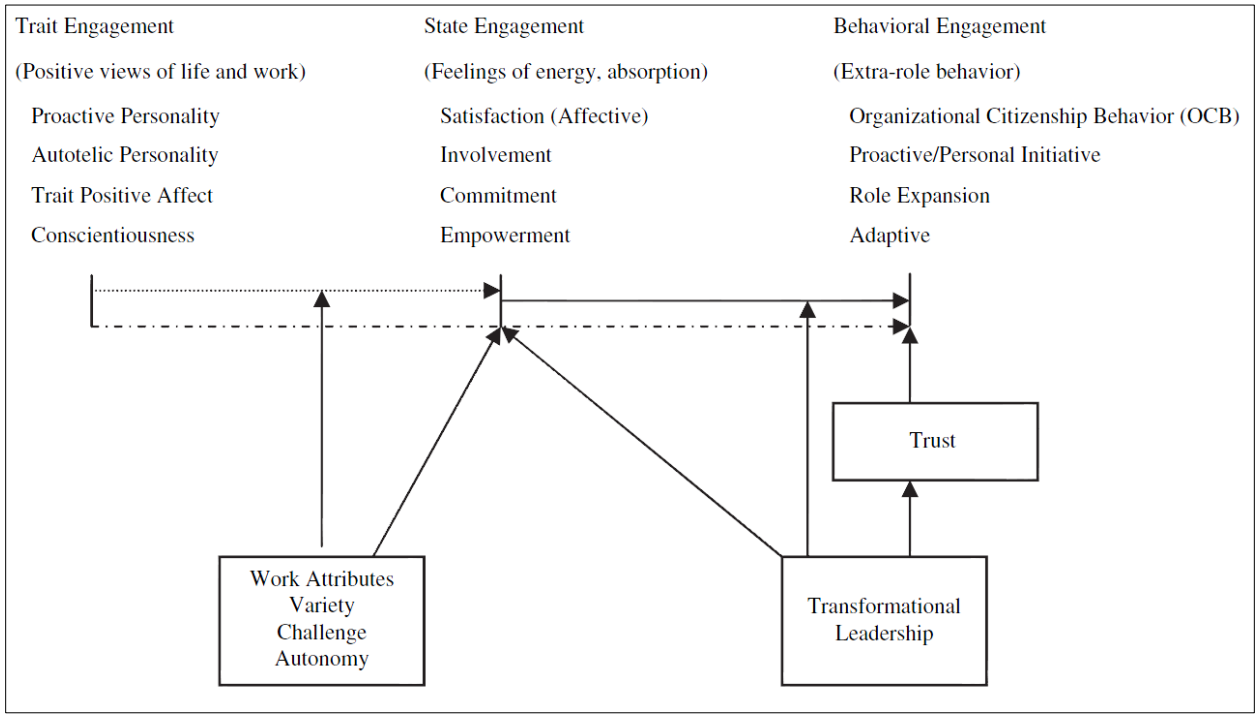

Figure 2 The Macey and Schneider (2008) conceptual framework for understanding the elements of employee engagement

The framework positions psychological state engagement as a direct antecedent of behavioral engagement, which is exemplified by extra-role behaviors such as organizational citizenship behavior, proactive/personal initiative, role expansion, and adaptive behaviors (Macey & Schneider, 2008). The framework also illustrates the influence of other conceptual constructs affecting employee performance, such as work attributes, leadership styles, and trust, on the various states of engagement (Macey & Schneider, 2008). Using their framework as a model and examining prior academic and applied literature, Macey and Schneider (2008)

attempted to demonstrate how their framework could be used to help researchers and practitioners gain a firmer understanding of engagement. The ultimate goal Macey and Schneider (2008) noted was to "illuminate the unique attributes of prior research that most occupy the conceptual space we would call engagement so that future research and practice can more precisely identify the nature of the engagement construct they are pursuing" (p. 6).

Christian et al. (2011) attempted to further clarify the concept of engagement as a separate and distinct construct. Drawing from 200 published and 30 unpublished articles, the researchers were able to identify 91 studies and papers on work engagement spanning a 20-year period. From a meta-analysis of the 91 studies and papers, Christian et al. (2011) identified a variety of definitions and measures for work engagement. Their analysis resulted in an operational definition of work engagement as "a relatively enduring state of mind referring to the simultaneous investment of personal energies in the experience or performance of work" (Christian et al., 2011, p. 95).

Macey and Schneider (2008) expressed concern over the lack of rigorous conceptualization and study of the potential antecedents and consequences of engagement and their relationships with one another. This indicated, according to Christian et al. (2011), "an inadequate understanding of work engagement's nomological network" (p. 90). Trochim (2006) describes a nomological network as a method of ensuring construct validity by specifying the theoretical framework for the concept, providing an empirical framework, and showing how the theoretical and empirical frameworks link together. Christian et al. (2011) developed a model to illustrate the nomological network of work engagement (see Figure 3). In their model, Christian et al. (2011) conceptualized work engagement and the related construct of job attitudes as the

proximal factors mediating the influence of specific distal antecedents (job characteristics) on the consequences (job performance).

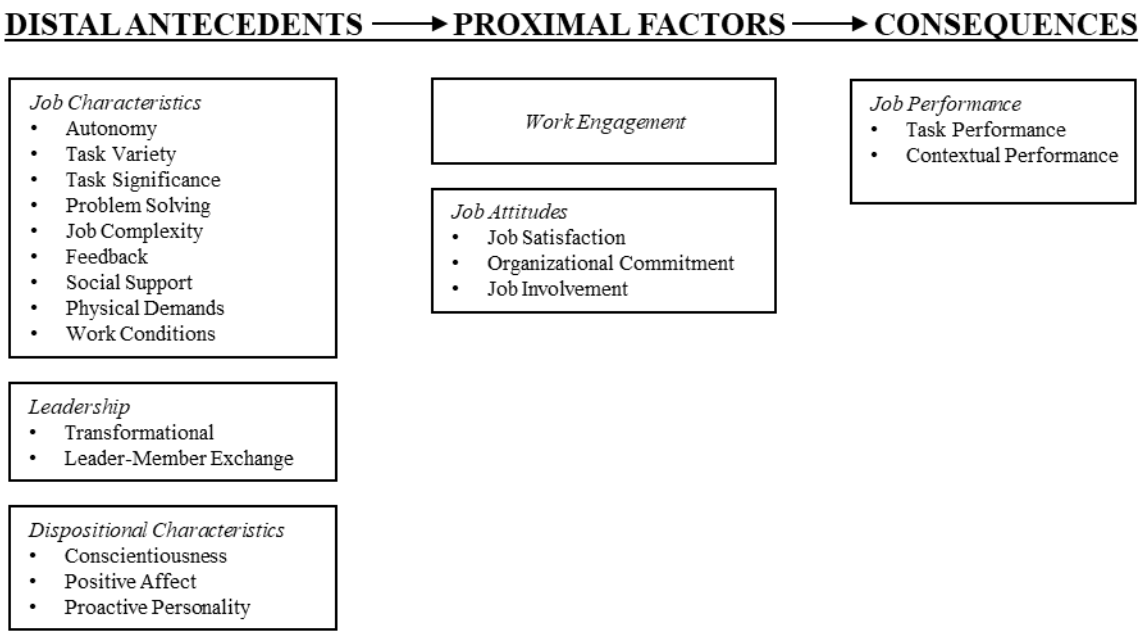

Figure 3 The Christian et al. (2011) conceptual framework of work engagement

Christian et al. (2011) selected the model's distal antecedents using the various descriptions and measures of work engagement identified in their meta-analysis. From this analysis, they also selected the separate proximal factors of work engagement and job attitudes, and the consequences of job performance (Christian et al., 2011). The Christian et al. (2011) framework is based on the model (see Figure 2) developed by Macey and Schneider (2008). However, whereas Macey and Schneider (2008) considered trait engagement and state engagement to be separate concepts, Christian et al. (2011) followed the view of Dalal, Brummel, Wee, and Thomas (2008), adopting the view that state engagement should be referred

to as engagement, in recognition that engagement likely contains components that are both trait-like and state-like. According to Dalal et al. (2008),

> a state typically conveys the idea of within-person variation occurring over a period of 1 week or less (and, frequently, over a period of hours or even minutes); conversely, a trait typically conveys the idea of within-person stability over periods of at least several weeks or months. (p. 52)

Christian et al. (2011) used relevant variable measures gleaned from their review of 91 applicable studies to test their model for discriminant validity. *The Sage encyclopedia of social science research methods* (Lewis-Beck, Bryman, & Liao, 2004) defines discriminant validity as a method of determining the relatedness of separate constructs by using correlation coefficients. The higher the correlation coefficient, that is the closer it is to 1.0 (Harter & Schmidt, 2008), the less likely it is that the two constructs are empirically distinct from one another (Lewis-Beck et al., 2004). According to Christian et al. (2011), the results of their tests showed sufficiently low correlation coefficients between work engagement and the three separate aspects of job attitudes shown in the model indicating discriminant validity between job attitudes and work engagement. When the correlation coefficients were calculated between work engagement, the various aspects of the antecedents, and consequences from the model, the results suggested separateness, with sufficiently low correlation coefficients in every instance to indicate discriminant validity (Christian et al., 2011).

Measurement

Alreck and Settle (2003) note that all organizations require accurate, reliable, and valid information, or data, to operate successfully. Liker and Meier (2005) suggest the development of specific metrics and measurement devices aimed at specific behaviors and actions as one way to acquire such data. This segment of the literature review will examine research and writings

surrounding specific instruments or techniques used to gather data relevant to communication within organizations, employee work engagement, and job performance in industrial settings.

Measuring Employee Communication Satisfaction

One measure of organizational communication effectiveness that has long been associated with positive organizational outcomes is communication satisfaction (Clampitt & Downs, 1993; Downs & Adrian, 2004; Downs & Hazen, 1977). Hecht (1978) defined communication satisfaction as "the affective response to the fulfillment of expectation-type standards" (p. 350). In Hecht's (1978) view, communication satisfaction is a critical determinant of an individual's psychological adjustment. The personal benefits Hecht (1984) ascribed to communication satisfaction were improved mental health, more effective and rewarding relationships, and improvements in the success of interactions with others. Early conceptualizations of communication satisfaction, as suggested by Hecht (1978), viewed it as an unidimensional construct, dependent upon an individual's personal view of the success of his/her communicative interactions with others (Downs & Adrian, 2004; Downs & Hazen, 1977; Thayer, 1986).

With regard to individuals within organizations, however, others saw communication satisfaction as a more multidimensional construct (Crino & White, 1981; Downs & Adrian, 2004), which defined an individual's satisfaction with various aspects of communication in his/her organization as the key determinant in that individual's overall level of communication satisfaction (Crino & White, 1981). A perspective such as this influenced Downs and Hazen (1977) when they introduced a new survey instrument to measure communication satisfaction within organizations. Instead of relying solely upon personal factors to determine levels of

communication satisfaction, the Downs and Hazen (1977) survey took into account a number of other communication variables and strategies that contribute to a variety of organizational goals. The survey instrument has since come to be widely known as the Downs Hazen Communication Satisfaction Questionnaire (Downs & Hazen, 1977).

The original intent of the Communication Satisfaction Questionnaire (CSQ) was to provide information about communication satisfaction that could be used as a barometer to indicate an organization's functioning (Downs & Hazen, 1977). Today, the CSQ has become one of the most widely used methods for auditing internal communication systems (Downs & Adrian, 2004; Zwijze-Koning & de Jong, 2007). It is seen as one of the most comprehensive and most validated communications audit instruments available, and is relatively short and easy to administer in relation to other quantitative communication satisfaction assessment instruments (Downs & Adrian, 2004; Gray & Laidlaw, 2004; Gregson, 1991; Zwijze-Koning & de Jong, 2007).

According to Downs and Adrian (2004), the CSQ was designed to provide information relative to seven separate factors affecting an individual's level of communication satisfaction. As it has been refined over the years, an eighth factor, personal feedback, has been added (Downs & Adrian, 2004). Downs and Adrian (2004) conceived the following eight factors of the CSQ: communication climate, communication with supervisors, organizational integration, media quality, horizontal and informal communication, organizational perspective, communication with subordinates, and personal feedback.

The CSQ has been tested on numerous occasions and found to be a reliable and valid method of gathering data relative to the strengths and weaknesses of organizational communication systems (Downs & Adrian, 2004; Meintjes & Steyn, 2006; Zwijze-Koning & de

Jong, 2007). Downs and Adrian (2004) note that the instrument has been proven useful in a wide variety of organizational settings and cultures, based on their review of over a dozen previously published works. Gray and Laidlaw (2004) used the CSQ to survey 127 members of an Australian retail association. They concluded that, despite its age, the original factor structure of the CSQ, as hypothesized by Downs and Hazen (1977), remains a valid method of measuring communication satisfaction (Gray & Laidlaw, 2004). Meintjes and Steyn (2006) reached a similar conclusion in a study involving 269 full-time employees at a private higher educational institution in South Africa. In addition to suggesting that the CSQ remains a valid instrument for measuring communication satisfaction after nearly 30 years, the questionnaire also stands up to minor modification (Meintjes & Steyn, 2006). The researchers altered the wording of the CSQ questions to make it relevant to the South African educational environment in which they were conducting their survey and confirmed the reliability of the survey results by calculating a Cronbach's alpha reliability coefficient for each of the CSQ's eight factors (Meintjes & Steyn, 2006).

In a study designed to evaluate the strengths and weaknesses of the CSG, Zwijze-Koning and de Jong (2007) compared a 10-factor version of the CSQ suggested by Gray and Laidlaw (2004) to the critical incident technique (CIT), a qualitative communication satisfaction assessment instrument that gathers assessment data through individual interviews (Downs & Adrian, 2004). The researchers interviewed 165 employees from three secondary education institutions using the CIT. At the end of their interviews, participants were asked to complete a CSQ. Zwijze-Koning and de Jong (2007) then completed a comparative analysis of the qualitative data from the CIT and the quantitative data from the CSQ. They concluded that the CSQ remains a useful tool for identifying the communication factors employees view as

important (Zwijze-Koning & de Jong, 2007). The CSQ was found to benefit organizations looking for insight into which aspects of their communication systems have significant influence over their employees' general level of communication satisfaction (Zwijze-Koning & de Jong, 2007).

According to Carrière and Bourque (2009), the factors found to be most closely associated with communication satisfaction, as measured by the CSQ, are personal feedback, communication climate, and communication with supervisors. This is in line with Welch's (2011) conceptual model of employee engagement and internal corporate communication, which describes these types of communication practices as having a direct influence on employee engagement.

Measuring Employee Work Engagement

Shuck, Zigarmi, and Owen (2015) noted that many unique research streams have developed around the concept of engagement, creating a variety of definitions of the concept and consequently, many measurement preferences. Selecting any one school of thought limits the options for measuring and defining engagement (Shuck et al., 2015). While there has been much research in recent years and many definitions offered, Saks and Gruman (2014) maintain that the academic literature is still reliant on only two main definitions of engagement: the definition offered by Kahn (1990) and that offered by Schaufeli et al. (2002). To Kahn (1990), engagement is the degree to which the members of an organization employ and express themselves physically, cognitively, and emotionally during their role performances. In Schaufeli et al.'s (2002) view, engagement is "a positive, fulfilling, work related state of mind that is characterized by vigor, dedication, and absorption" (p. 74). In the Welch (2011) model, engagement is

presented as the combination of the definitive aspects of engagement suggested by Kahn (1990) and by Schaufeli et al. (2002). These aspects of engagement are illustrated in association with the three psychological conditions Kahn (1990) suggested as necessary to individuals deciding how much or how little to invest themselves in the performance of their roles: meaningfulness, safety, and availability. The Welch (2011) model's conceptualization of engagement is in line with Schaufeli and Bakker's (2010) assertion that "both academic conceptualizations that define engagement in its own right agree that it entails a behavioral-energetic (vigor), an emotional (dedication), and a cognitive (absorption) component" (p. 13).

Many researchers (Bakker et al., 2010; Christian et al., 2011; Rich et al., 2010; Saks & Gruman, 2014; Shuck et al., 2015; Viljevac, Cooper-Thomas, & Saks, 2012) note that the most widely used scientifically derived measure of engagement has been the Utrecht Work Engagement Scale (UWES). The UWES is a 17-item survey designed to measure the Schaufeli et al. (2002) dimensions of engagement. The 17-item UWES provides a single composite work engagement score and separate scores for each of the three sub-scales or dimensions: vigor, dedication, and absorption (Schaufeli, Bakker, & Salanova, 2006).

In 2006, citing basic pragmatism as their motivation, Schaufeli et al. (2006) reduced the number of questions in the UWES from 17 to nine "because respondents should not be unnecessarily bothered" (p. 703) and "long questionnaires increase the likelihood of attrition" (p. 703). Using confirmatory factor analyses on data collected in 10 different countries from more than 14,000 participants, Schaufeli et al. (2006) concluded that the factorial validity of the 9-item UWES (UWES-9) was demonstrable and the psychometric properties of the UWES-9 scores were such that "the instrument can be used in studies on positive organizational behavior" (p. 701). However, in the analysis of the data they used to validate their UWES-9, Schaufeli et al.

(2006) found the potential for problems with multi-collinearity when the measures for the three sub-scales were entered simultaneously, as independent predictors in a regression equation. As a result, they recommended that researchers using the UWES-9 use the single composite work engagement score instead of three scale scores. More recent studies have made the same recommendation (Balducci, Fraccaroli, & Schaufeli, 2010; de Bruin & Henn, 2013).

Balducci et al. (2010) found the correlation between the three factors to be very high, ranging from .90 to .94, casting doubt on the discriminant validity of the three subscales. Likewise, a study by de Bruin and Henn (2013), while confirming the multidimensionality of the UWES-9, found a significant lack of discriminant validity between the sub-scales. They concluded that interpreting and using separate subscale scores is likely to be unproductive and recommended the interpretation of a total score instead (de Bruin & Henn, 2013, p. 796).

Measuring Job Performance

This study used the Company's existing performance measures to gauge job performance. The Company's assembly manufacturing operations produce thousands of consumer-grade cooking products each day on its assembly lines and individual assembly cells (Baker, 2015). According to the Company's Manufacturing Quality Manager, each assembly line or cell produces a specific product or product family (Baker, 2015). Assembly cells may have as few as one or two operators performing scores of operations to build a few products a day; whereas some assembly lines may employ more than 250 operators to perform specific tasks on as many as 1,500 products or more over the course of the same time period (Baker, 2015).

The number and complexity of the operations an operator may be asked to perform depend upon the complexity of the product built on the operator's particular assembly cell or assembly line (Baker, 2015). According to Baker (2015), some products consist of as few as 100 parts or less, while other products may be composed of more than 400 individual parts. As Breyfogle (1992) notes, such complexity of design makes it impractical to test all possible combinations of failure. Consequently, according to Baker (2015), the Company tests only those functions that are required by industry standards or federal regulations. The Company uses a final assembly pass/fail functional test routine (Breyfogle, 1992) that evaluates no fewer than 10 functions, depending on the product. The tests help to ensure that each product is safe to operate and that it will meet the operational expectations of the specific regulatory agencies and the final consumer (Baker, 2015).

Data from the final assembly functional testing are, according to Baker (2015), used to generate a first-pass yield score (Marr, 2013) for each assembly line. First-pass yield is the percentage of the total daily output that passes through the final assembly functional testing routines without a specific quality issue (Marr, 2013). The Company uses first-pass yield scores to keep track of specific product defects (Baker, 2015), making it possible to generate a first-pass yield score for a specific work team using the functional test results associated with the assembly operations of that team. For the purposes of this study the first-pass yield scores for each of the teams were calculated from product defects identified in the final assembly functional testing routines that are related to the control panel and radiant cooktop assemblies. The company does not presently have a method for collecting first-pass yield data relative to the performance of individual operators (Baker, 2015).

Summary

This chapter examined research and writings relevant to the various components of the Welch (2011) model described in Chapter 1. The influence of organizational leadership and organizational communication on the behavior of the individuals who comprise the organization was discussed. The concept of individual satisfaction with internal corporate communication and how to measure it was reviewed. Additionally, the concept of employee engagement and its justification as an independent area of academic study was examined. Research surrounding a measurement device that may be used to measure work engagement as illustrated by the Welch (2011) model was reviewed, and the measures the Company uses to quantify the job performance of some individual assembly operators were reviewed.

CHAPTER III

METHODOLOGY

Introduction

The intent of this study was to explore the relationships between employee satisfaction with the Company's internal corporate communications processes, employee work engagement, and job performance as measured by data derived from the product testing areas of the assembly lines. Interval data (Alreck & Settle, 2003) were gathered from five sample groups and were analyzed to explore findings relevant to the study's research questions. Two separate measurement instruments were used to gather individual communication satisfaction and work engagement data from the sample groups. The job performance data were derived from each of the five groups' end of assembly functional testing findings over a three-week period. This chapter will discuss the methodology behind the selection of the sample population, the specifics of the measurement instruments, how the measurement instruments were administered, and by what methods the collected data were analyzed.

Sample

The data for the study was collected using cluster sampling (Hinkle, Wiersma, & Jurs, 2002; Triola, 2008), which involves dividing the population into definable sections and surveying all of the members in the selected clusters. Five work teams were chosen from three assembly lines to serve as the sample of the population. Each of the assembly lines build similar

products. The selected work teams build components for their respective assembly lines which are subjected to end of assembly functional tests (Breyfogle, 1992). These tests provide comparable first-pass yield scores (Marr, 2013). At the time of this study, Team 1 consisted of 12 members, Team 2 of 16, Team 3 of 9, Team 4 of 20, and Team 5 of 15. In total, the sample populations represented 4.22% of the Company's total, non-salaried workforce and 7.19% of non-salaried employees working in the Company's assembly operations at that point in time.

Measurement Instruments

Data for the study were collected from the sample population using three sources. A modified version of the Downs and Hazen Communication Satisfaction Questionnaire (CSQ) detailed in Downs and Adrian (2004) was used to collect data relevant to communication satisfaction (see Appendix A for a copy of the modified CSQ). The 9-item Utrecht Work Engagement Scale (Schaufeli et al., 2006) was used to measure individual levels of work engagement (see Appendix B for a copy of the UWES-9). Individual work team job performance was measured using first-pass yield data (Marr, 2013) collected from each team's end of assembly functional testing area. As previously described, first-pass yield is the percentage of the total daily output that passes through the final assembly functional testing routines (Baker, 2015) without a specific quality issue (Marr, 2013).

The Modified Communication Satisfaction Questionnaire

The CSQ collects data relative to eight separate factors affecting an individual's level of communication satisfaction (Clampitt & Downs, 1993; Downs & Adrian, 2004; Gray & Laidlaw, 2004; Zwijze-Koning & de Jong, 2007). The eight factors measured by the CSQ are

communication climate, communication with supervisors, organizational integration, media quality, horizontal and informal communication, organizational perspective, communication with subordinates, and personal feedback (Downs & Adrian, 2004). The CSQ, as described by Downs and Adrian (2004), is a 46-question survey organized into six parts. The first section of the original Downs and Adrian (2004) CSQ is a paragraph explaining the purpose and intent of the survey. Section two consists of three questions relative to the respondent's satisfaction with his/her job. The third section includes 14 questions asking respondents to use a 7-point Likert scale (Alreck & Settle, 2003) to rank their level of satisfaction with job related information. In section three, the same 7-point scale is used to answer to a further 21 questions pertaining to seven of the eight dimensions of communication satisfaction described above (Downs & Adrian, 2004). Section four includes three questions that ask respondents to rank their perceived productivity (Downs & Adrian, 2004). The final section is intended for individuals in a supervisory or managerial role. It asks five questions relative to supervisor communication, the eighth dimension of communication satisfaction identified by Downs and Hazen (1977).

The CSQ used in the study was a modified version of the Downs and Adrian (2004) CSQ described above. The modified CSQ was divided into four parts and consisted of an introduction and 37 questions (see Appendix A). The first part of the modified CSQ, the introduction, notifies the respondent that the purpose of the survey is to help determine team members' levels of satisfaction with the Company's communication practices. Part A of the modified CSQ replaces the three questions about job satisfaction from the original Downs and Adrian (2004) CSQ with two demographic questions: How long have you worked at [company name]; and Gender. Part B consists of questions 3 through 16. Respondents are asked to use a 7-point Likert scale (Alreck & Settle, 2003) to rank their level of satisfaction with job related

information. The section is prefaced with a detailed explanation on how to use the scale to answer the questions. Since the Company operates as a cost center within its parent corporation and is not measured in terms of profit and loss (Reece, 2011a), the term "profits" is deleted from Question 15 in Part B of the modified CSQ. Part C of the modified CSQ repeats the rating scale from Part C as instructions for answering questions 17 through 37. The perceptions of individual productivity were not germane to the study, and only data from work team members with no supervisory role were included. The three questions seeking information about perceived productivity and the five questions intended for individuals in a supervisory or managerial role in the original Downs and Adrian (2004) CSQ were not included in the study's modified CSQ.

In place of the generic term "ACME" used in the original Downs and Adrian (2004) CSQ, the name of the Company was inserted throughout the modified CSQ. As part of the Company's commitment to a team-based organizational structure (Reece, 2011a), it is a standing policy to avoid the use of the term supervisor. Consequently, that term was replaced with the term leader in questions 17, 19, 21, 24, and 28 of the modified CSQ.

The breakdown of the factors and their associated questions in the modified CSQ were:

- Communication climate – Questions 18, 20, 22, 25, and 26. These questions examine the extent to which communication motivates employees to meet the organization's goals as well as employee perceptions of the health of communications within the organization (Downs & Adrian, 2004; Downs & Hazen, 1977)
- Communication with supervisors – Questions 19, 21, 23, 28, and 33. These questions examine employee attitudes with regard to both the communications

from supervisors to employees and communications from employees to supervisors (Downs & Adrian, 2004; Downs & Hazen, 1977).

- Organizational integration – Questions 3, 4, 9, 10, and 14. These questions examine employee attitudes with regard to communications about their immediate work environment such as pay, benefits, job performance, departmental plans, and departmental goals (Downs & Adrian, 2004; Downs & Hazen, 1977).
- Media quality – Questions 24, 32, 34, 35, and 37. These questions examine employee attitudes in relation to publications, meetings, and other communication channels. They also examine employee perceptions as to the adequacy of the total amount of communications (Downs & Adrian, 2004; Downs & Hazen, 1977).
- Horizontal and informal communication – Questions 27, 29, 30, 31, and 36. These questions examine employee attitudes with regard to workplace rumors, how accurate and free-flowing informal communication is between employees, and how compatible individual teams are perceived to be (Downs & Adrian, 2004; Downs & Hazen, 1977).
- Organizational perspective – Questions 5, 11, 12, 15, and 16. These questions examine employee attitudes with regard to communication about the organization's overall health, its finances, performance, and regulations affecting it (Downs & Adrian, 2004; Downs & Hazen, 1977).
- Personal feedback – Questions 6, 7, 8, 13, and 17. These questions examine employee attitudes with regard to communications relevant to how an

individual's performance is judged and appraised (Downs & Adrian, 2004; Downs & Hazen, 1977).

Seven individual CSQ factor scores were calculated for each individual survey. This was accomplished by adding the scores of each question associated with each of the seven factors and expressing the score as a percentage of the highest possible total. Similarly, an individual CSQ score for each survey, as well as seven team CSQ factor scores, and a single CSQ team score for each team were calculated in to express each score as a percentage of the highest possible total.

The UWES-9

The nine-question version of the Utrecht Work Engagement Scale proposed by Schaufeli et al. (2006) was used to gather data with regard to individual employee levels of work engagement. In addition to the original UWES-9 survey's nine questions, the version administered to the study participants included two demographic questions: one to determine the respondent's length of service with the Company and the other to determine the respondent's gender (see Appendix B). An individual UWES-9 score was calculated for each survey by totaling the value of the nine questions on the survey and expressing the score as a percentage of the highest possible total. A UWES-9 team score for each team was calculated in a similar fashion.

First-Pass Yield Scores

First-pass yield scores (Marr, 2013) were determined using the final assembly pass/fail functional test routines (Breyfogle, 1992) for each of the work teams in the sample. Data consisting of the functional test results data from each team's assembly line were collected for

three weeks. The collection period started one week prior and ended one week after the administration of the modified CSQ and the UWES-9 surveys. From this data, a three-week average first-pass yield score (Marr, 2013) was calculated for each of the sample work teams.

Data Collection

Both the modified CSQ and the Schaufeli et al. (2006) UWES-9 were administered to each of the five work teams during the same week as part of the teams' regular weekly team meetings (Reece, 2010). A member of the Company's Human Resource staff administered surveys to each of the teams comprising the sample. Before distributing the surveys, the human resource proctor informed the team members of the purpose of the survey and explained that participation in the survey was voluntary. Each team member was given a letter of consent and was asked to read the letter and sign it to signify their willingness to participate in the study. The proctor collected the signed letters and placed them in a separate envelope before the surveys were distributed. Each team member who agreed to participate in the study was given a survey packet consisting of both surveys stapled together. Stapling the two surveys together verified that the surveys in the packet were completed by the same individual. Each of the participants was also required to write their specific work team number on their survey packet to facilitate tracking team-specific responses.

Data Analysis

The interval data (Alreck & Settle, 2003; Field, 2013) collected using the methods described above were analyzed with respect to the study's four research questions and their attendant hypotheses. The software program Statistical Package for the Social Sciences (SPSS)

for Windows, Release Version 24.0, was used for the statistical analysis of all of the data collected for the study. The internal consistency, or reliability, of the modified CSQ survey results was assessed by calculating a Cronbach's alpha reliability coefficient statistic (Field, 2013; Gliem & Gliem, 2003) for both the modified CSQ as well as for each of the modified CSQ's seven factors. The internal consistency and reliability of the UWES-9 survey instrument was similarly assessed.

The data collected from the sample population were subjected to a series of normality tests to help ensure that the statistics generated from the data could be considered reliable (Field, 2013). Assessing the normality of data is a necessary requirement for parametrical statistical tests (Field, 2013; Ghasemi & Zahediasl, 2012; Pyrczak & Bruce, 2008). The use of graphical, numerical, and significance tests of normality are all recommended to better ensure the approximate normal distribution of the data (Doane & Seward, 2011; Field, 2013; Ghasemi & Zahediasl, 2012; Hinkle et al., 2002). For this study, graphical assessment of the normality of the data sets from both the modified CSQ and the UWES-9 (Schaufeli et al., 2006) were accomplished using histograms and normal quantile quantile (QQ) plots (Doane & Seward, 2011; Field, 2013; Ghasemi & Zahediasl, 2012; Leech, Barrett, & Morgan, 2005). The numerical assessment method used was the Shapiro-Wilk normality test (Razali & Wah, 2011). Skewness and kurtosis coefficient statistics were used for the significance testing of the data for normality (Field, 2013; Ghasemi & Zahediasl, 2012).

Once the normal distribution of the data was reasonably established, the Pearson product-moment correlation coefficient (Pearson's r), simple linear regression, multiple regression, and multivariate analysis of variance (MANOVA) were used as the principal statistical tools to analyze the data with respect to the research questions (Field, 2013; Hinkle et al., 2002; Urdan,

2010). A reliable way to determine relationships between variables is to analyze correlation coefficients for the variables (Field, 2013; Hinkle et al., 2002). According to Hinkle et al. (2002), if there is a relationship between the performance of two variables, it can be said there is correlation between the two variables that can be expressed as a correlation coefficient, provided the variables are paired observations measured on an interval or ratio scale.

The Pearson's *r* correlation coefficient method is a popular way of determining linear relationships between variables, where the correlation coefficient is represented by the value of *r* (Hinkle et al., 2002). The value of Pearson's *r* value will fall between -1.0 and 1.0, with values approaching -1.0 indicating a negative correlation, where the variables change in opposite directions by the same amount, and values approaching 1.0 indicating a positive correlation, where the variables change in the same direction by the same amount (Field, 2013; Hinkle et al., 2002). Values that are close to 0 in either the positive or negative range are indicative of no correlation, where a change in one variable results in no change at all in the other variable (Field, 2013; Hinkle et al., 2002).

Linear regression is similarly used to establish correlation, except that linear regression can also be used to make predictions about the value of one variable, the dependent variable, based upon the value of another variable, the independent or predictor variable (Field, 2013; Hinkle et al., 2002; Urdan, 2010). Simple regression uses only one independent variable to make predictions about only one dependent variable, whereas multiple regression uses two or more independent variables to make predictions about the value of a single dependent variable (Field, 2013; Hinkle et al., 2002; Urdan, 2010). One or more of these three methods of data analysis, Pearson's *r* correlation coefficient, simple linear regression, and multiple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010), were used to establish correlation coefficients and to

explore the possibility of predictive relationships from the data relevant to research questions R_1, R_2, and R_3.

Analysis of Survey Responses Relevant to Research Question R_1

For research question R_1, "Is there a significant relationship between employee communication satisfaction and employee work engagement in the workplace," the Pearson's *r* correlation coefficient model of correlation analysis (Field, 2013; Urdan, 2010) was used to derive correlation coefficients between participant's CSQ scores and UWES-9 scores. Correlation coefficients were also derived using participant UWES-9 scores and the seven CSQ factor scores. Additionally, Pearson's *r* correlation coefficient analysis (Field, 2013; Urdan, 2010) was used to derive correlation coefficients between each individual work team's CSQ team score and that team's UWES-9 team score. Simple linear regression was used and multiple linear regression analysis was attempted in the examination of the data for predictive relationships relevant to research question R_1 (Field, 2013; Hinkle et al., 2002; Urdan, 2010). The various combinations of variables used in the Pearson's *r* correlation coefficient analyses and of independent and dependent variables used in the linear regression analyses are described in Table 1.

Table 1 Combinations of variables used in computing correlation coefficients with the Pearson's *r* correlation coefficient method and combinations of independent and dependent variables used in simple linear regression and multiple linear regression analysis of research question R_1

Pearson's r Variable Combinations

Variable	Variable
Participant CSQ scores	Participant UWES-9 scores
Participant UWES-9 scores	Participant CSQ factor scores
CSQ team scores	UWES-9 team scores

Simple Linear Regression Variable Combinations

Independent Variable	Dependent Variable
Participant UWES-9 scores	Participant CSQ scores
Participant CSQ scores	Participant UWES-9 scores
UWES-9 team scores	CSQ team scores
Participant UWES-9 scores	Participant CSQ factor scores

Multiple Linear Regression Variable Combinations

Independent Variable	Dependent Variable
Participant CSQ factor scores	Participant UWES-9 scores

Analysis of Survey Responses Relevant to Research Question R_2

Research question R_2 asks "Is there a significant relationship between employee work engagement and job performance?" To help clarify an answer to this question, the Pearson's *r* correlation coefficient model of correlation analysis (Field, 2013; Urdan, 2010) was used to derive correlation coefficients between the teams' UWES-9 team scores and the teams' three-week average first-pass yield score (Marr, 2013). Simple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010) was used to explore the possibility of a predictive relationship between the teams' UWES-9 team scores and the teams' three-week average first-pass yield score (Marr, 2013). Pearson's *r* analysis and simple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were also used to explore the possibility of a predictive relationship between the individual

participant UWES-9 percentage scores and the teams' three-week average first-pass yield scores (Marr, 2013).

Analysis of Survey Responses Relevant to Research Question R_3

For research question R_3, "Is there a significant relationship between employee communication satisfaction and job performance," the Pearson's *r* correlation coefficient model (Field, 2013; Hinkle et al., 2002; Urdan, 2010) was used to derive correlation coefficients between each work team's CSQ team score and that team's three-week average first-pass yield score (Marr, 2013) as well as between the individual participant CSQ percentage scores and the teams' three-week average first-pass yield scores (Marr, 2013). The Pearson's *r* correlation coefficient model (Field, 2013; Hinkle et al., 2002; Urdan, 2010) was also used to derive correlation coefficients between each team's seven team CSQ factor scores and that team's three-week average first-pass yield score (Marr, 2013). Simple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010) was used to explore the possibility of a predictive relationship between a team's CSQ team score and that team's three-week average first-pass yield score (Marr, 2013) as well as between the individual participant CSQ percentage scores and the teams' three-week average first-pass yield scores (Marr, 2013).

Analysis of Survey Responses Relevant to Research Question R_4

MANOVA and a follow up discriminant function analysis (Field, 2013) were used to examine the collected data relevant to research question R_4, "Is there a significant difference in levels of communication satisfaction, work engagement, and job performance between sample populations in the workplace?" The MANOVA test allows for the measurement of relationships

between different groups, or independent variables, with respect to several outcomes, or dependent variables (Field, 2013). Field (2013) suggests the multivariate capability of MANOVA is desirable over the univariate analysis of variance (ANOVA) test in that the increased likelihood of Type I errors can be avoided. According to Field (2013), running multiple ANOVA tests using the same data set can be associated with Type I errors. A Type I error results when relationships are found where there are none (Field, 2013). The MANOVA test was followed up with a discriminant functional analysis, a series of tests which help to determine if it is possible to separate the teams based on multiple predictors (Field, 2013).

The MANOVA was conducted using the team assignments of each case in the data set as the independent, or predictor, variable. The dependent, or outcome, variables were the individual CSQ scores, individual UWES-9 scores, and the combined three-week average first-pass yield scores. The discriminant functional analysis used the team assignments of each case in the data set as the grouping variable. The individual CSQ scores, individual UWES-9 scores, and the combined three-week average first-pass yield scores were used as the independents.

Summary

This study collected data from five similar work teams from separate assembly lines. The data were collected using a modified version of the Downs and Hazen CSQ (Downs & Adrian, 2004), the UWES-9 (Schaufeli et al., 2006), and first-pass yield scores (Marr, 2013). The first-pass yield scores (Marr, 2013) were derived from the end of assembly functional test areas for each of the sample groups. The collected data were validated for internal consistency and reliability using Cronbach's alpha statistic (Field, 2013; Gliem & Gliem, 2003). The approximate normal distribution of the modified CSQ and UWES-9 data sets were assessed

using both numerical and graphical methods (Field, 2013; Ghasemi & Zahediasl, 2012; Leech et al., 2005; Razali & Wah, 2011). Pearson's *r* correlation coefficient testing, simple linear regression, multiple linear regression, and MANOVA analysis techniques (Alreck & Settle, 2003; Field, 2013; Hinkle et al., 2002; Urdan, 2010) were used as described previously to explore each of the study's four research questions.

CHAPTER IV

RESULTS

Introduction

The intent of this study was to explore the relationships between employee satisfaction with the Company's internal corporate communications processes, employee work engagement, and job performance. The measurement instruments used, respectively, were a modified version of the Downs and Hazen Communication Satisfaction Questionnaire (Downs & Adrian, 2004), the nine question Utrecht Work Engagement Survey (Schaufeli et al., 2006), and first-pass yield data derived from the product testing areas of the assembly lines (Baker, 2015; Marr, 2013). The sample population for the study consisted of the members of five separate work teams from three similar assembly lines. Interval data (Alreck & Settle, 2003) gathered from the sample groups were collected and analyzed to explore the following four research questions:

R_1: Is there a significant relationship between employee communication satisfaction and employee work engagement in the workplace?

R_2: Is there a significant relationship between employee work engagement and job performance?

R_3: Is there a significant relationship between employee communication satisfaction and job performance?

R_4: Is there a significant difference in levels of employee communication satisfaction, employee work engagement, and job performance between sample populations in the workplace?

Survey Instrument Reliability Testing

To help to ensure confidence in the internal consistency, or reliability, of the two survey instruments, separate Cronbach's alpha reliability coefficients (Field, 2013; Gliem & Gliem, 2003) were calculated for both the modified CSQ and the UWES-9. Cronbach's alpha reliability coefficients (Field, 2013; Gliem & Gliem, 2003) were also calculated for each of the modified CSQ's seven factors (see Table 2). According to Gliem and Gliem (2003), surveys using Likert-type scales should be assessed at a Cronbach's alpha reliability coefficient of at least 0.8 to be considered reasonably internally consistently and reliable. Surveys with an alpha of 0.9 or higher, they assert, can be considered to have excellent internal consistency and reliability (Gliem & Gliem, 2003).

Table 2 Cronbach's Alpha Reliability Coefficient Statistics for the Modified CSQ, Each of the Seven Modified CSQ Factors, and the UWES-9

Modified CSQ Reliability Statistics	
Cronbach's Alpha	N of Items
.977	35

Modified CSQ Factor 1	
Cronbach's Alpha	N of Items
.937	5
Modified CSQ Factor 2	
Cronbach's Alpha	N of Items
.911	5
Modified CSQ Factor 3	
Cronbach's Alpha	N of Items
.812	5
Modified CSQ Factor 4	
Cronbach's Alpha	N of Items
.908	5
Modified CSQ Factor 5	
Cronbach's Alpha	N of Items
.822	5
Modified CSQ Factor 6	
Cronbach's Alpha	N of Items
.860	5
Modified CSQ Factor 7	
Cronbach's Alpha	N of Items
.903	5
UWES-9	
Cronbach's Alpha	N of Items
.867	9

Using the criteria for establishing internal consistency and reliability of survey instruments through Cronbach's alpha reliability coefficient statistics as suggested by Gliem and Gliem (2003), the data collection instruments used in the study can be viewed as having good to excellent internal consistency and reliability. The modified CSQ's alpha statistic was 0.977. The UWES-9's alpha statistic was 0.867. Likewise, the separate alpha statistics generated for

each of the seven modified CSQ factors also rate as either excellent or good, with alpha statistics of 0.937 (Factor 1), 0.911 (Factor 2), 0.812 (Factor 3), 0.908 (Factor 4), 0.822 (Factor 5), 0.860 (Factor 6), and 0.903 (Factor 7).

Assessing Normality

Two of the most commonly used graphical indicators of the approximate normality of data sets are histograms and normal QQ plots (Field, 2013; Leech et al., 2005). Both of these graphical methods of assessing normality were applied to data sets using the modified CSQ and the UWES-9. Histograms graphically represent the frequency distribution of a data set in the form of a bar chart and provide a researcher a quick graphical view of the location and distribution of the data points in a data set (Field, 2013; Ghasemi & Zahediasl, 2012). The more a histogram resembles a normal distribution curve, the more likely the data in the data set approximates a normal distribution (Field, 2013; Ghasemi & Zahediasl, 2012).

Figure 4 shows the histogram (Field, 2013; Ghasemi & Zahediasl, 2012) of the individual percentage scores collected using the modified CSQ. The normal curve has been overlaid onto the histogram to indicate the expected shape of the graph if the data were normally distributed (Field, 2013; Ghasemi & Zahediasl, 2012). In this instance, the data represented in Figure 4 appears to be negatively skewed (Doane & Seward, 2011; Field, 2013; Ghasemi & Zahediasl, 2012).

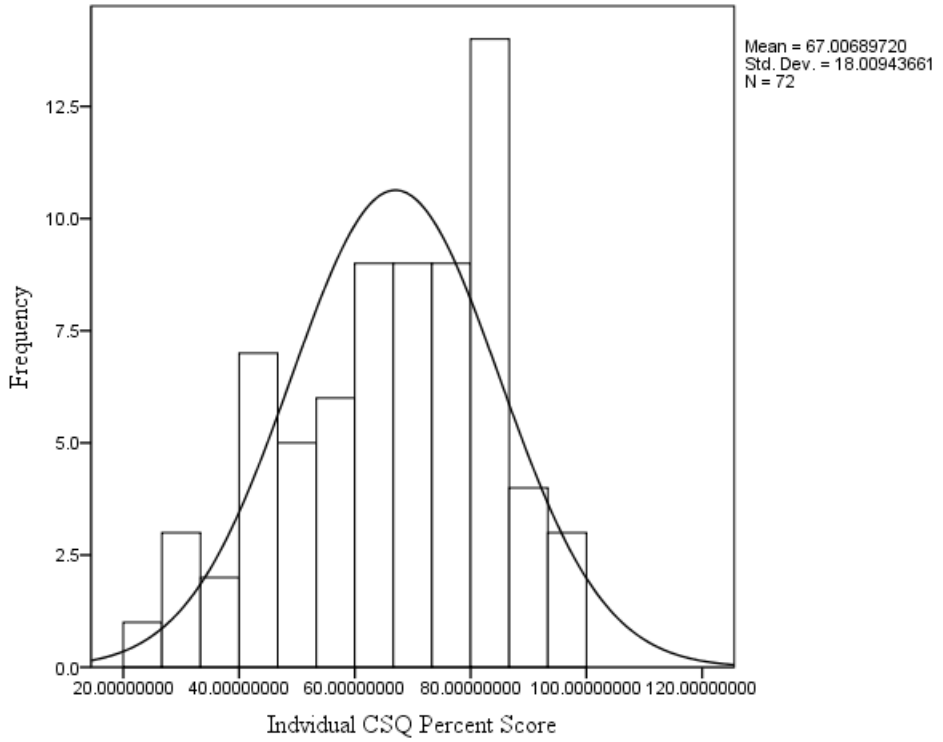

Figure 4 Histogram of Individual CSQ Percentage Scores

Doane and Seward (2011) note that a perfect bell-shape is not a requirement for a data set to be considered normally distributed and that skewness is not necessarily an indicator of non-normal data. Skewness is a measure of the symmetry of a data distribution (Field, 2013). It may be described in several ways. Where data points are distributed evenly on both sides of the normal curve, the skewness is called symmetrical. Positive, or right skewed data is characterized by most of the data points being positioned to the right of center under a tail trailing to the right. Negative, or left skewed data will have most of the data points positioned to the left of center under a tail trailing to the left (Doane & Seward, 2011; Field, 2013; Ghasemi & Zahediasl, 2012).

Figure 5 shows the normal QQ plot (Field, 2013; Leech et al., 2005) of the individual percentage scores collected using the modified CSQ. Normal QQ plots split a data set into equal

values, or quantiles, and display them in relation to a straight line that represents the expected distribution of the quantiles if the data are normally distributed (Field, 2013). The closer the points on the plot hew to the line, the more likely it is that the data are normally distributed (Field, 2013). The normal QQ plot of the individual percentage scores collected using the modified CSQ seen in Figure 5 shows that the quantile points do not appear to seriously deviate from the straight line, indicating that the data have an approximately normal distribution (Field, 2013; Ghasemi & Zahediasl, 2012; Leech et al., 2005).

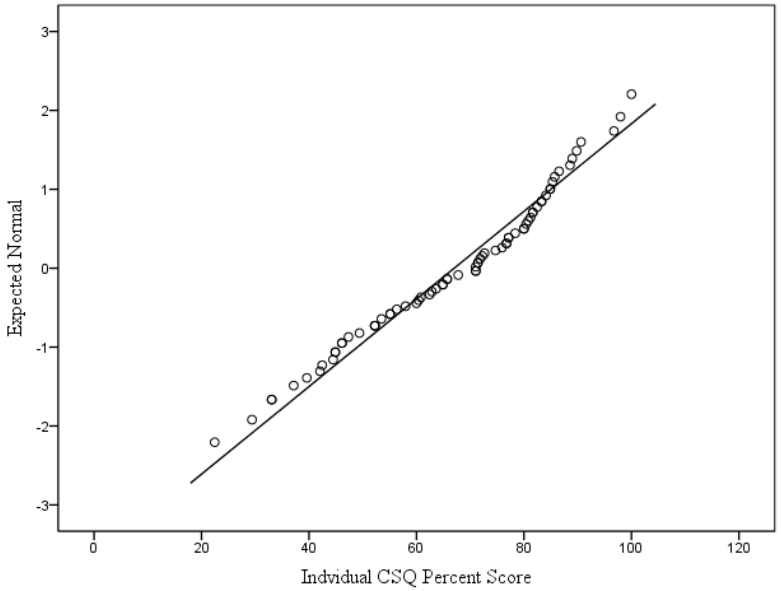

Figure 5 Normal Q-Q Plot of Individual CSQ Percentage Scores

The histogram (Field, 2013; Ghasemi & Zahediasl, 2012) of the individual percentage scores collected using the UWES-9 is shown in Figure 6. As with the modified CSQ histogram shown in Figure 4 above, the normal curve has been overlaid onto the histogram to indicate the expected shape of the graph were the data normally distributed (Field, 2013; Ghasemi &

Zahediasl, 2012). The UWES-9 data represented in Figure 6 appears to be negatively skewed (Doane & Seward, 2011; Field, 2013; Ghasemi & Zahediasl, 2012).

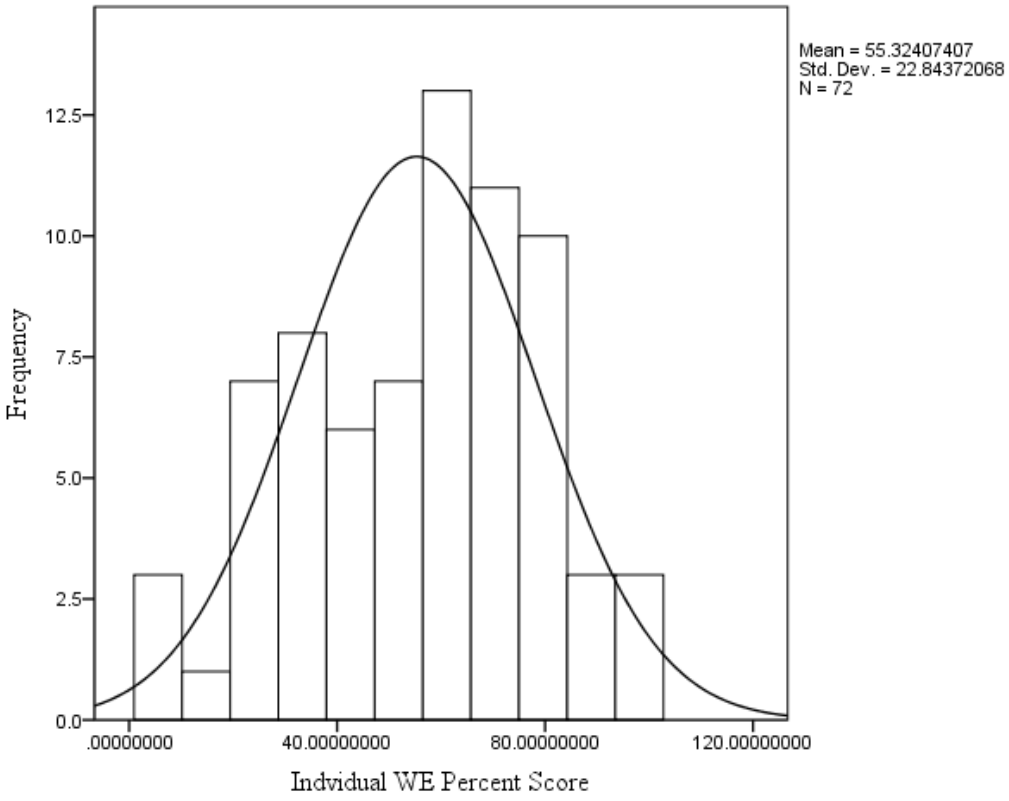

Figure 6 Histogram of Individual UWES-9 Percentage Scores

The normal QQ plot (Field, 2013; Leech et al., 2005) of the individual UWES-9 is shown in Figure 7. Although the quantile data points do not precisely align with the straight line representing a perfectly normal distribution, there does not appear to be any serious deviation. The rough alignment of the data points in the Figure 7 normal QQ plot appear to indicate that the individual UWES-9 data have an approximately normal distribution (Field, 2013; Ghasemi & Zahediasl, 2012; Leech et al., 2005).

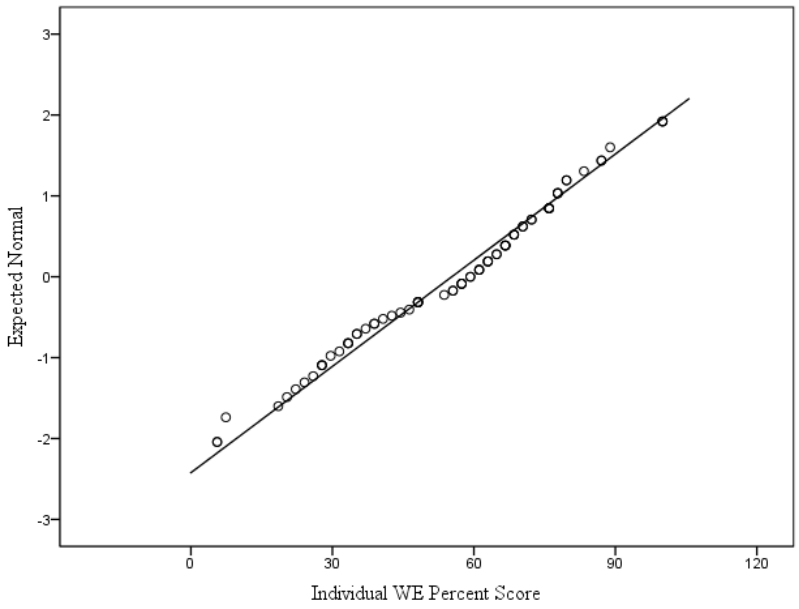

Figure 7 Normal Q-Q Plot of Individual UWES-9 Percentage Scores

The graphical representations of the data sets generated using the modified CSQ and the UWES-9 in histogram and normal QQ plots (Field, 2013; Ghasemi & Zahediasl, 2012; Leech et al., 2005) appear to show approximate normality in the distributions of the sets. It is, however, recommended that multiple methods of assessing normality be used to better ensure that the data sets can be reliably assumed to have approximate normal distributions (Doane & Seward, 2011; Field, 2013; Ghasemi & Zahediasl, 2012; Hinkle et al., 2002). In line with the recommendation, further assessment for normality was conducted using numerical and significance testing methods.

According to Razali and Wah (2011), the Shapiro-Wilk test is a desirable method for the numerical assessment of normality for data sets drawn from small samples of 2,000 or less. The Shapiro-Wilk test generates a statistic that will fall between 0 and 1. Test statistics approaching 0 are an indication of non-normal distribution of the data. Test statistics that approach 1 are an

indication that the distribution of the data is approximately normal (Razali & Wah, 2011). As can be seen in Table 3, the Shapiro-Wilk test statistic of 0.969 for the modified CSQ and 0.977 for the UWES-9 indicates that the data collected from both surveys can be assumed to be approximately normal (Ghasemi & Zahediasl, 2012; Razali & Wah, 2011).

Table 3 Shapiro-Wilk Tests of Normality for the Modified CSQ and the UWES-9

Tests of Normality

	Shapiro-Wilk		
	Statistic	Df	Sig.
Individual CSQ Percent Score	.969	72	.072
Individual WE Percent Score	.977	72	.206

Both Field (2013) and Ghasemi and Zahediasl (2012) suggest using skewness and kurtosis coefficient statistics for a significance test of normality. The absolute values of the coefficient statistics are divided by their standard errors to calculate a *z*-score. A *z*-score lower than 1.96 indicates a normal distribution (Field, 2013). Table 4 shows the skewness and kurtosis statistics generated from the individual CSQ percent scores. Applying the *z*-score test (Field, 2013) to the skewness and kurtosis coefficient statistics for the modified CSQ results in a 1.47 skewness *z*-score and a 1.05 kurtosis *z*-score. According to the significance test suggested by Field (2013) and Ghasemi and Zahediasl (2012), the *z*-scores are within the range of acceptability for assuming the approximate normality of the data.

Table 4 Skewness and Kurtosis Statistics from the Individual CSQ Percent Scores

Individual CSQ Percent Score		
N	Valid	72
	Missing	0
Skewness		-.417
Std. Error of Skewness		.283
Kurtosis		-.592
Std. Error of Kurtosis		.559

Table 5 shows the individual UWES-9 scores. The UWES-9 results were skewness 0.79 and kurtosis 0.95, also within the range of acceptability for assuming approximate normality (Field, 2013; Ghasemi & Zahediasl, 2012). These results for skewness and kurtosis, combined with the results of the histograms, normal QQ plots, and Shapiro-Wilk assessments, appear to provide sufficient evidence that both of the data sets used in this analysis closely approximate normal distributions (Doane & Seward, 2011; Field, 2013; Ghasemi & Zahediasl, 2012; Leech et al., 2005).

Table 5 Skewness and Kurtosis Statistics from the Individual UWES-9 Scores

Individual WE Percent Score		
N	Valid	72
	Missing	0
Skewness		-.225
Std. Error of Skewness		.283
Kurtosis		-.534
Std. Error of Kurtosis		.559

Analysis of Survey Responses Relevant to Research Question R_1

The Pearson's *r* correlation, simple linear regression, and multiple linear regression analyses (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were used to examine the data for predictive relationships relevant to research question R_1: Is there a significant relationship between employee communication satisfaction and employee work engagement in the workplace? Table 6 shows the results of the Pearson's *r* correlation analysis (Field, 2013; Urdan, 2010) used to derive correlation coefficients between the individual participant CSQ percentage scores and the individual participant UWES-9 percentage scores. The Pearson correlation of 0.546 and levels of significance lower than 0.010 indicate that there is a large positive correlation between the CSQ and UWES-9 scores (Field, 2013; Hinkle et al., 2002; Urdan, 2010).

Table 6 Pearson's *r* Correlation Coefficients for the Individual Participant CSQ Percentage Scores and the Individual Participant UWES-9 Percentage Scores

Correlation

				Individual CSQ Percent Score	Individual WE Percent Score
Individual CSQ Percent Score	Pearson Correlation			1	.546**
	Sig. (2-tailed)				.000
	N			72	72
	Bootstrap[c]	Bias		0	.001
		Std. Error		0	.077
		BCa 95% Confidence Interval	Lower	.	.370
			Upper	.	.690
Individual WE Percent Score	Pearson Correlation			.546**	1
	Sig. (2-tailed)			.000	
	N			72	72
	Bootstrap[c]	Bias		.001	0
		Std. Error		.077	0
		BCa 95% Confidence Interval	Lower	.370	.
			Upper	.690	.

**. Correlation is significant at the 0.01 level (2-tailed).

c. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Pearson's *r* correlation analysis (Field, 2013; Urdan, 2010) was used to derive correlation coefficients between the individual UWES-9 percentage scores and the individual participant CSQ scores for each of the seven CSQ factors. Table 7 shows the results of that analysis with Pearson's *r* coefficients of 0.571 for the CSQ factor "Climate," 0.538 for "Communication with Supervisors," 0.464 for "Organizational Integration," 0.516 for "Media Quality," 0.521 for "Horizontal and Informal Communication," 0.424 for "Organizational Perspective," and 0.393 for "Personal Feedback" (Field, 2013; Urdan, 2010).

Table 7 Pearson's *r* Correlation Coefficients for the Individual Participant UWES-9 Percentage Scores and Individual Participant Percentage Scores for Each of the Seven CSQ Factors

Correlation

				Ind WE Percent Score	Climate	Comm w/Sup	Org Integration	Media Quality	Horizontal & Informal	Org Perspective	Personal Feedback
Individual WE Percent Score	Pearson Correlation			1	.571**	.538**	.464**	.516**	.521**	.424**	.393**
	Sig. (2-tailed)				.000	.000	.000	.000	.000	.000	.001
	N			72	72	72	72	72	72	72	72
	Bootstrap[c]	Bias		0	-.002	.000	-.003	-.003	-.002	-.005	.000
		Std. Error		0	.077	.075	.089	.086	.086	.083	.099
		BCa 95% Confidence Interval	Lwr		.401	.378	.278	.332	.324	.261	.204
			Upr		.713	.681	.616	.671	.685	.564	.564
Climate	Pearson Correlation			.571**	1	.931**	.797**	.900**	.833**	.815**	.827**
	Sig. (2-tailed)			.000		.000	.000	.000	.000	.000	.000
	N			72	72	72	72	72	72	72	72
	Bootstrap[c]	Bias		-.002	0	.000	-.002	.000	.001	-.003	-.001
		Std. Error		.077	0	.019	.051	.029	.033	.045	.043
		BCa 95% Confidence Interval	Lwr	.401		.884	.677	.826	.748	.714	.727
			Upr	.713		.964	.881	.949	.898	.889	.904
Comm w/Sup	Pearson Correlation			.538**	.931**	1	.771**	.859**	.734**	.775**	.798**
	Sig. (2-tailed)			.000	.000		.000	.000	.000	.000	.000
	N			72	72	72	72	72	72	72	72
	Bootstrap[c]	Bias		.000	.000	0	-.002	-.001	.003	-.004	-.002
		Std. Error		.075	.019	0	.063	.034	.055	.053	.050

	BCa 95% Confidence Interval	Lwr	.378	.884		.628	.779	.593	.643	.682
		Upr	.681	.964		.879	.918	.850	.865	.888
Org Integration	Pearson Correlation		.464**	.797**	.771**	1	.762**	.640**	.864**	.755**
	Sig. (2-tailed)		.000	.000	.000		.000	.000	.000	.000
	N		72	72	72	72	72	72	72	72
	Boots trap[c] Bias		-.003	-.002	-.002	0	-.001	.001	-.003	.001
	Boots trap[c] Std. Error		.089	.051	.063	0	.068	.063	.030	.055
	BCa 95% Confidence Interval	Lwr	.278	.677	.628		.610	.507	.797	.626
		Upr	.616	.881	.879		.869	.759	.914	.863
Media Quality	Pearson Correlation		.516**	.900**	.859**	.762**	1	.811**	.739**	.781**
	Sig. (2-tailed)		.000	.000	.000	.000		.000	.000	.000
	N		72	72	72	72	72	72	72	72
	Boots trap[c] Bias		-.003	.000	-.001	-.001	0	.002	-.004	-.001
	Boots trap[c] Std. Error		.086	.029	.034	.068	0	.040	.067	.058
	BCa 95% Confidence Interval	Lwr	.332	.826	.779	.610		.718	.592	.644
		Upr	.671	.949	.918	.869		.889	.849	.876
Horizontal & Informal	Pearson Correlation		.521**	.833**	.734**	.640**	.811**	1	.602**	.725**
	Sig. (2-tailed)		.000	.000	.000	.000	.000		.000	.000
	N		72	72	72	72	72	72	72	72
	Boots trap[c] Bias		-.002	.001	.003	.001	.002	0	-.003	.001
	Boots trap[c] Std. Error		.086	.033	.055	.063	.040	0	.069	.056
	BCa 95% Confidence Interval	Lwr	.324	.748	.593	.507	.718		.455	.578
		Upr	.685	.898	.850	.759	.889		.727	.830
	Pearson Correlation		.424**	.815**	.775**	.864**	.739**	.602**	1	.694**

Org Perspective	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000		.000
	N		72	72	72	72	72	72	72	72
	Bootstrap[c]	Bias	-.005	-.003	-.004	-.003	-.004	-.003	0	-.002
		Std. Error	.083	.045	.053	.030	.067	.069	0	.069
		BCa 95% Confidence Interval Lwr	.261	.714	.643	.797	.592	.455		.529
		BCa 95% Confidence Interval Upr	.564	.889	.865	.914	.849	.727		.817
Personal Feedback	Pearson Correlation		.393**	.827**	.798**	.755**	.781**	.725**	.694**	1
	Sig. (2-tailed)		.001	.000	.000	.000	.000	.000	.000	
	N		72	72	72	72	72	72	72	72
	Bootstrap[c]	Bias	.000	-.001	-.002	.001	-.001	.001	-.002	0
		Std. Error	.099	.043	.050	.055	.058	.056	.069	0
		BCa 95% Confidence Interval Lwr	.204	.727	.682	.626	.644	.578	.529	
		BCa 95% Confidence Interval Upr	.564	.904	.888	.863	.876	.830	.817	

**. Correlation is significant at the 0.01 level (2-tailed).

c. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

The correlation coefficients for the CSQ factors Climate, Communication with Supervisors, Media Quality, and Horizontal and Informal Communication are all greater than 0.500. These values, combined with the individual factors' levels of significance values lower than 0.010, indicate that there is a large positive correlation between the individual UWES-9 scores and each of these four CSQ factors (Field, 2013; Urdan, 2010). The correlation coefficients for the CSQ factors for Organizational Integration and Organizational Perspective are both greater than 0.400. These values, combined with the individual factors' levels of significance values lower than 0.010, indicate that there is a medium positive correlation between the individual UWES-9 scores and each of these two CSQ factors (Field, 2013; Urdan, 2010). The correlation coefficient for the CSQ factor Personal Feedback is 0.393. This value, along with the significance value that is lower than 0.010, indicates that there is a small positive correlation between the individual UWES-9 scores and each of the CSQ factors (Field, 2013; Urdan, 2010).

Table 8 shows the results of the Pearson's *r* correlation analysis (Field, 2013; Urdan, 2010) used to derive correlation coefficients between the CSQ percentage scores for each of the teams and the UWES-9 team percentage scores. The Pearson correlation of 0.879 and levels of significance of 0.050 indicate that there is a large positive correlation between the team CSQ percentage scores and the team UWES-9 percentage scores (Field, 2013; Hinkle et al., 2002; Urdan, 2010).

Table 8 Pearson's *r* Correlation Coefficients for the Team CSQ Percentage Scores and the Team UWES-9 Percentage Scores

Correlation

				Team CSQ % Scores	Team WE % Scores
Team CSQ % Scores	Pearson Correlation			1	.879*
	Sig. (2-tailed)				.050
	N			5	5
	Bootstrap[d]	Bias		0[e]	-.022[e]
		Std. Error		0[e]	.224[e]
		BCa 95% Confidence Interval	Lower	.[e]	-1.000[e]
			Upper	.[e]	1.000[e]
Team WE % Scores	Pearson Correlation			.879*	1
	Sig. (2-tailed)			.050	
	N			5	5
	Bootstrap[d]	Bias		-.022[e]	0[e]
		Std. Error		.224[e]	0[e]
		BCa 95% Confidence Interval	Lower	-1.000[e]	.[e]
			Upper	1.000[e]	.[e]

*. Correlation is significant at the 0.05 level (2-tailed).

d. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

e. Based on 999 samples

Simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) was used to answer a number of questions related to the data. The questions included : could the individual participant UWES-9 percentage scores be used to make reliable predictions about the individual participant CSQ percentage scores; could the individual participant CSQ percentage scores be used to make reliable predictions about the individual participant UWES-9 percentage scores; could the UWES-9 team percentage scores be used to make predictions about the CSQ team percentage scores; and could the individual participant UWES-9 percentage scores be used to make predictions about the individual participant percentage scores for each of the seven CSQ

factors. According to Field (2013), the reliability of linear regression assessments conducted using SPSS for Windows can be judged according to the values of three statistics generated by the program: the value of the R^2 statistic, shown in the Model Summary table; the value of the *F*-ratio's associated significance value, shown in the ANOVA table; and the *b*-value statistic's associated significance value, shown in the Bootstrap for Coefficients table.

The R^2 statistic represents the proportion of variance in the dependent variable shared by the independent variable. The adjusted R^2 statistic, also shown in the Model table, can be used as a cross-validation of the model (Field, 2013). The adjusted R^2 statistic represents the variance in the dependent variable if the model were created using the entire population from which the sample was taken (Field, 2013). Typically, the larger the value of R^2 and the adjusted R^2, the more reliable the model (Field, 2013). The *F*-ratio indicates how different the means are in relation to the variability within the sample (Field, 2013). If the *F*-ratio's associated significance value is < 0.05, the regression model can be viewed as reliable to a 95% level of confidence (Field, 2013). The *b*-value statistic represents the strength of the relationship between the independent and the dependent variables (Field, 2013). A *b*-value statistic associated significance value of < 0.05 can be viewed as a reliable indicator that the independent variable is a significant predictor of the dependent variable (Field, 2013).

Table 9 shows the results of a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) using the individual participant UWES-9 percentage scores as the independent, or predictor, variable and the individual participant CSQ percentage scores as the dependent, or outcome, variable. The R^2 value of 0.298 and the adjusted R^2 value of 0.288, shown in the Model Summary table in Table 9, indicate that individual participant UWES-9 percentage scores account for less than 30% of the variation in individual participant CSQ

percentage scores, meaning more than 70% of the remaining scores are likely influenced by other variables (Field, 2013). The *F*-ratio's associated significance value of < 0.001, shown in the ANOVA table in Table 9, indicates that this regression model can be viewed as predicting individual participant CSQ percentage scores significantly better than chance (Field, 2013). This finding is further supported by the *b*-value statistic's associated significance value, shown in the Bootstrap for Coefficients table in Table 9, of 0.001 (Field, 2013).

Table 9 Simple Linear Regression Analysis Using Individual Participant UWES-9 Percentage Scores as the Independent Variable and Individual Participant CSQ Percentage Scores as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.546[a]	.298	.288	15.19150295000

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6873.403	1	6873.403	29.783	.000[b]
	Residual	16154.723	70	230.782		
	Total	23028.126	71			

a. Dependent Variable: Individual CSQ Percent Score

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	43.178	4.719		9.150	.000
	Individual WE Percent Score	.431	.079	.546	5.457	.000

a. Dependent Variable: Individual CSQ Percent Score

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	43.178	.416	4.819	.001	33.408	53.878
	Individual WE Percent Score	.431	-.006	.077	.001	.279	.567

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

The simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) shown in Table 10 used the individual participant CSQ percentage scores as the predictor and the individual participant UWES-9 percentage scores as the outcome. The R^2 value and the adjusted R^2 value, 0.298 and 0.288, respectively, indicate that individual CSQ scores account for less than 30% of the variation in the individual UWES-9 scores. With the *F*-ratio's associated significance value of < 0.001 and the *b*-value statistic's associated significance value of 0.001, this regression model can be viewed with some confidence as predicting individual UWES-9 scores significantly better than chance (Field, 2013).

Table 10 Simple Linear Regression Analysis Using Individual Participant CSQ Percentage Scores as the Independent Variable and Individual Participant UWES-9 Percentage Scores as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.546[a]	.298	.288	19.26936737000

a. Predictors: (Constant), Individual CSQ Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11058.729	1	11058.729	29.783	.000[b]
	Residual	25991.596	70	371.309		
	Total	37050.326	71			

a. Dependent Variable: Individual WE Percent Score

b. Predictors: (Constant), Individual CSQ Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.889	8.806		1.009	.316
	Individual CSQ Percent Score	.693	.127	.546	5.457	.000

a. Dependent Variable: Individual WE Percent Score

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	8.889	.038	8.630	.272	-7.770	26.438
	Individual CSQ Percent Score	.693	-.001	.119	.001	.443	.930

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Table 11 shows a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) with an R^2 value of 0.772 and the adjusted R^2 value of 0.696 using the UWES-9

team percentage scores as the predictor variable and the CSQ team percentage scores as the outcome variable. These numbers indicate that the UWES-9 team scores account for between 70% and 77% of the variation in CSQ team scores (Field, 2013). Although the *F*-ratio significance value of 0.50 and the *b*-value significance value of 0.043 indicate that this regression model is on the borderline of significance, it may still be considered a reliable predictor of CSQ team scores (Field, 2013).

Table 11 Simple Linear Regression Analysis Using UWES-9 Team Percentage Scores as the Independent Variable and CSQ Team Percentage Scores as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.879[a]	.772	.696	4.93302282900

a. Predictors: (Constant), Team WE % Scores

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	247.379	1	247.379	10.166	.050[b]
	Residual	73.004	3	24.335		
	Total	320.383	4			

a. Dependent Variable: Team CSQ % Scores

b. Predictors: (Constant), Team WE % Scores

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-39.102	33.186		-1.178	.324
	Team WE % Scores	1.894	.594	.879	3.188	.050

a. Dependent Variable: Team CSQ % Scores

Bootstrap for Coefficients

Model			Bootstrap[a]				
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	-39.102	-3.932[b]	69.028[b]	.195[b]	-195.739[b]	166.074[b]
	Team WE % Scores	1.894	.074[b]	1.235[b]	.043[b]	1.171[b]	3.872[b]

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

b. Based on 998 samples

The simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) results shown in Table 12 uses the individual participant UWES-9 percentage scores as the predictor and individual participant scores for the CSQ factor "Climate" as the outcome. The R^2

value of 0.326 and the adjusted R^2 value of 0.317, viewed in relation to the *F*-ratio's significance value of < 0.001 and the *b*-value significance of 0.001, indicate that this regression model predicts participant scores for the CSQ factor "Climate" significantly better than chance (Field, 2013).

Table 12 Simple Linear Regression Analysis Using Individual Participant UWES-9 Percentage Scores as the Independent Variable and Individual Participant Percentage Scores for the CSQ Factor "Climate" as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.571[a]	.326	.317	18.97215287000

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12195.402	1	12195.402	33.882	.000[b]
	Residual	25195.981	70	359.943		
	Total	37391.383	71			

a. Dependent Variable: Climate

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	31.910	5.894		5.414	.000
	Individual WE Percent Score	.574	.099	.571	5.821	.000

a. Dependent Variable: Climate

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	31.910	.181	6.069	.001	19.643	44.457
	Individual WE Percent Score	.574	-.004	.096	.001	.386	.760

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

The individual participant UWES-9 percentage scores were used as the predictor and individual participant scores for the CSQ factor "Communication with Supervisors" as the

outcome in the simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) shown in Table 13. Taken together, the R^2 value of 0.289 and the adjusted R^2 value of 0.279, in relation to the *F*-ratio's significance value of < 0.001 and the *b*-value significance of 0.001, indicate that this regression model can be considered to predict participant scores for the CSQ factor "Communication with Supervisors" significantly better than chance (Field, 2013).

Table 13 Simple Linear Regression Analysis Using Individual Participant UWES-9 Percentage Scores as the Independent Variable and Individual Participant Percentage Scores for the CSQ Factor "Communication with Supervisors" as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.538[a]	.289	.279	18.97337827000

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10240.107	1	10240.107	28.446	.000[b]
	Residual	25199.236	70	359.989		
	Total	35439.342	71			

a. Dependent Variable: Comm w/Sup

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	37.066	5.894		6.289	.000
	Individual WE Percent Score	.526	.099	.538	5.333	.000

a. Dependent Variable: Comm w/Sup

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	37.066	-.190	5.647	.001	25.508	47.908
	Individual WE Percent Score	.526	.005	.088	.001	.344	.709

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

The predictor used in the simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) shown in Table 14 was individual participant UWES-9 percentage scores.

The outcome was individual participant scores for the CSQ factor "Organizational Integration." The R^2 value of 0.215 and the adjusted R^2 value of 0.204, in relation to the *F*-ratio's significance value of < 0.001 and the *b*-value significance of 0.001, indicate that this regression model predicts participant scores for the CSQ factor "Organizational Integration" significantly better than chance (Field, 2013).

Table 14 Simple Linear Regression Analysis Using Individual Participant UWES-9 Percentage Scores as the Independent Variable and Individual Participant Percentage Scores for the CSQ Factor "Organizational Integration" as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.464[a]	.215	.204	13.69083406000

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3592.086	1	3592.086	19.164	.000[b]
	Residual	13120.726	70	187.439		
	Total	16712.812	71			

a. Dependent Variable: Org Integration

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	55.909	4.253		13.146	.000
	Individual WE Percent Score	.311	.071	.464	4.378	.000

a. Dependent Variable: Org Integration

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	55.909	-.175	4.618	.001	46.927	64.722
	Individual WE Percent Score	.311	.004	.073	.001	.164	.468

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Table 15 shows a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) using the individual participant UWES-9 percentage scores as the predictor and

individual participant scores for the CSQ factor “Media Quality” as the outcome. An R^2 of 0.266 and an adjusted R^2 of 0.256, in relation to an *F*-ratio significance of < 0.001 and a *b*-value significance of 0.001, indicate a regression model that will predict participant scores for the CSQ factor “Media Quality” significantly better than chance (Field, 2013).

Table 15 Simple Linear Regression Analysis Using Individual Participant UWES-9 Percentage Scores as the Independent Variable and Individual Participant Percentage Scores for the CSQ Factor "Media Quality" as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.516[a]	.266	.256	17.43602813000

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7713.049	1	7713.049	25.371	.000[b]
	Residual	21281.055	70	304.015		
	Total	28994.104	71			

a. Dependent Variable: Media Quality

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	44.599	5.416		8.234	.000
	Individual WE Percent Score	.456	.091	.516	5.037	.000

a. Dependent Variable: Media Quality

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	44.599	.018	6.787	.001	30.785	58.026
	Individual WE Percent Score	.456	.001	.103	.001	.258	.659

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Table 16 shows a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) using the individual participant UWES-9 percentage scores as the predictor and

individual participant scores for the CSQ factor “Horizontal and Informal Communication” as the outcome. The R^2 value of 0.272 and the adjusted R^2 value of 0.261, in relation to the *F*-ratio’s significance value of < 0.001 and the *b*-value significance of 0.001, indicate a regression model capable of predicting participant scores for the CSQ factor “Horizontal and Informal Communication” significantly better than chance (Field, 2013).

Table 16 Simple Linear Regression Analysis Using Individual Participant UWES-9 Percentage Scores as the Independent Variable and Individual Participant Percentage Scores for the CSQ Factor "Horizontal and Informal Communication" as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.521[a]	.272	.261	16.25131677000

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6900.384	1	6900.384	26.127	.000[b]
	Residual	18487.371	70	264.105		
	Total	25387.755	71			

a. Dependent Variable: Horizontal & Informal

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	42.791	5.048		8.476	.000
	Individual WE Percent Score	.432	.084	.521	5.111	.000

a. Dependent Variable: Horizontal & Informal

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	42.791	.285	6.136	.001	31.023	55.835
	Individual WE Percent Score	.432	-.004	.097	.001	.244	.610

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Table 17 shows a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) using the individual participant UWES-9 percentage scores as the predictor and

individual participant scores for the CSQ factor “Organizational Perspective” as the outcome. The R^2 value of 0.180 and the adjusted R^2 value of 0.168, in relation to the *F*-ratio’s significance value of < 0.001 and the *b*-value significance of 0.001, indicate that this regression model predicts participant scores for the CSQ factor “Organizational Perspective” significantly better than chance (Field, 2013).

Table 17 Simple Linear Regression Analysis Using Individual Participant UWES-9 Percentage Scores as the Independent Variable and Individual Participant Percentage Scores for the CSQ Factor "Organizational Perspective" as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.424[a]	.180	.168	16.47506516000

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4167.403	1	4167.403	15.354	.000[b]
	Residual	18999.944	70	271.428		
	Total	23167.347	71			

a. Dependent Variable: Org Perspective

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	49.541	5.118		9.680	.000
	Individual WE Percent Score	.335	.086	.424	3.918	.000

a. Dependent Variable: Org Perspective

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	49.541	.004	4.900	.001	38.866	59.006
	Individual WE Percent Score	.335	-.001	.080	.001	.194	.476

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

In the simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) in Table 18, individual participant UWES-9 percentage scores are the predictor and individual

participant scores for the CSQ factor "Personal Feedback" are the outcome. An R^2 of 0.155 and an adjusted R^2 value of 0.143, taken with an *F*-ratio significance of 0.001 and a *b*-value significance of 0.001, indicate a regression model that can predict participant scores for the CSQ factor "Personal Feedback" significantly better than chance (Field, 2013).

Table 18 Simple Linear Regression Analysis Using Individual Participant UWES-9 Percentage Scores as the Independent Variable and Individual Participant Percentage Scores for the CSQ Factor "Personal Feedback" as the Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.393[a]	.155	.143	20.86145083000

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5580.889	1	5580.889	12.824	.001[b]
	Residual	30464.009	70	435.200		
	Total	36044.898	71			

a. Dependent Variable: Personal Feedback

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	38.766	6.480		5.982	.000
	Individual WE Percent Score	.388	.108	.393	3.581	.001

a. Dependent Variable: Personal Feedback

Bootstrap for Coefficients

Model		Bootstrap[a]					
		B	Bias	Std. Error	Sig. (2-tailed)	BCa 95% Confidence Interval	
						Lower	Upper
1	(Constant)	38.766	.269	5.699	.001	27.089	50.587
	Individual WE Percent Score	.388	-.005	.104	.001	.184	.581

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Multiple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010) was the final method used to examine the data relevant to research question R_1: Is there a significant

relationship between employee communication satisfaction and employee work engagement in the workplace? The predictor variables in this assessment were the individual participant CSQ scores for each of the seven CSQ factors. The individual participant UWES-9 percentage scores were used as the outcome variable.

According to Field (2013), when performing multiple linear regression assessments, it is important to stay alert to signs of bias, in particular, multicollinearity, an indication of excessively strong correlation between predictor variables (Field, 2013; Urdan, 2010). Where there is evidence of multicollinearity, the strong correlation among the predictor variables create serious problems with regard to reliably identifying "the unique relation between each predictor variable and the dependent variable" (Urdan, 2010, p. 154). The presence of strong multicollinearity, according to Field (2013), will render a multiple linear regression assessment practically useless. In SPSS, the presence of multicollinearity among the predictor variables in a multiple linear regression can be determined by looking at specific values in the Correlation, and Coefficients tables (Field, 2013).

Table 19 shows the Pearson Correlation section of the multiple linear regression Correlation table generated by using the individual participant CSQ percentage scores for each of the seven CSQ factors as the predictor variables and the individual participant UWES-9 percentage scores as the outcome variable. According to Field (2013), the presence of Pearson's *r* values greater than 0.9 strongly suggest multicollinearity between the predictors. In this instance, a Pearson's *r* value of 0.931 was calculated between the factors Climate and Communication with Supervisors. A Pearson's *r* value of 0.900 was calculated between the factors Climate and Media Quality.

Table 19 Pearson Correlation Section of the Multiple Linear Regression Correlation Table Using CSQ Participant Scores for Each of the Seven CSQ Factors as the Independent Variables and Participant UWES-9 Scores as the Outcome Variable

Correlation

		Individual WE Percent Score	Climate	Comm w/Sup	Org Integration	Media Quality	Horizontal & Informal	Org Perspective	Personal Feedback
Pearson Correlation	Individual WE Percent Score	1.000	.571	.538	.464	.516	.521	.424	.393
	Climate	.571	1.000	.931	.797	.900	.833	.815	.827
	Comm w/Sup	.538	.931	1.000	.771	.859	.734	.775	.798
	Org Integration	.464	.797	.771	1.000	.762	.640	.864	.755
	Media Quality	.516	.900	.859	.762	1.000	.811	.739	.781
	Horizontal & Informal	.521	.833	.734	.640	.811	1.000	.602	.725
	Org Perspective	.424	.815	.775	.864	.739	.602	1.000	.694
	Personal Feedback	.393	.827	.798	.755	.781	.725	.694	1.000
Sig. (1-77tailed)	Individual WE Percent Score	.	.000	.000	.000	.000	.000	.000	.000
	Climate	.000	.	.000	.000	.000	.000	.000	.000
	Comm w/Sup	.000	.000	.	.000	.000	.000	.000	.000
	Org Integration	.000	.000	.000	.	.000	.000	.000	.000
	Media Quality	.000	.000	.000	.000	.	.000	.000	.000
	Horizontal & Informal	.000	.000	.000	.000	.000	.	.000	.000
	Org Perspective	.000	.000	.000	.000	.000	.000	.	.000
	Personal Feedback	.000	.000	.000	.000	.000	.000	.000	.
N	Individual WE Percent Score	72	72	72	72	72	72	72	72

Climate	72	72	72	72	72	72	72	72
Comm w/Sup	72	72	72	72	72	72	72	72
Org Integration	72	72	72	72	72	72	72	72
Media Quality	72	72	72	72	72	72	72	72
Horizontal & Informal	72	72	72	72	72	72	72	72
Org Perspective	72	72	72	72	72	72	72	72
Personal Feedback	72	72	72	72	72	72	72	72

Further evidence of multicollinearity in this assessment is suggested in Table 20 by the variable inflation factor (VIF) values (Field, 2013) generated in the Coefficients table. A variable's VIF is an indicator of that variable's linear relationship with other predictors (Field, 2013). Field (2013) says researchers should view VIF values greater than 10 as convincing evidence of high collinearity. If the average value of all of the VIF statistics is greater than 1, this will also provide evidence that multicollinearity is creating bias in the regression (Field, 2013). The highest VIF value evidenced in Table 20 is 16.256 for the factor Climate and the average of all the CSQ factor VIF values is 6.923. These values are both well above the values suggested by Field (2013) as evidence of bias in the regression due multicollinearity.

Table 20 Multiple Linear Regression Coefficients Table Using CSQ Participant Scores for Each of the Seven CSQ Factors as the Independent Variables and Participant UWES-9 Scores as the Outcome Variable

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlation			Collinearity Statistics	
		B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	19.139	6.603		2.899	.005	5.970	32.308					
	Climate	.568	.098	.571	5.821	.000	.374	.763	.571	.571	.571	1.000	1.000
2	(Constant)	18.747	7.049		2.659	.010	4.684	32.810					
	Climate	.527	.269	.529	1.959	.054	-.010	1.063	.571	.230	.194	.134	7.467
	Comm w/Sup	.046	.276	.045	.167	.868	-.504	.597	.538	.020	.017	.134	7.467
3	(Constant)	17.638	11.774		1.498	.139	-5.857	41.133					
	Climate	.515	.288	.517	1.789	.078	-.059	1.090	.571	.212	.178	.118	8.447
	Comm w/Sup	.042	.281	.041	.149	.882	-.518	.602	.538	.018	.015	.132	7.602
	Org Integration	.029	.248	.020	.118	.906	-.465	.523	.464	.014	.012	.358	2.793
4	(Constant)	17.617	12.320		1.430	.157	-6.974	42.208					
	Climate	.514	.331	.516	1.555	.125	-.146	1.174	.571	.187	.156	.091	10.971
	Comm w/Sup	.042	.285	.041	.146	.884	-.527	.610	.538	.018	.015	.130	7.710
	Org Integration	.029	.252	.019	.115	.909	-.475	.533	.464	.014	.012	.349	2.861

	Media Quality	.002	.265	.002	.006	.995	-.527	.531	.516	.001	.001	.183	5.473
5	(Constant)	12.728	13.426		.948	.347	-14.079	39.535					
	Climate	.357	.372	.358	.958	.341	-.387	1.100	.571	.117	.096	.072	13.889
	Comm w/Sup	.106	.293	.104	.361	.719	-.480	.692	.538	.044	.036	.122	8.172
	Org Integration	.051	.254	.034	.202	.841	-.456	.558	.464	.025	.020	.346	2.887
	Media Quality	-.076	.278	-.067	-.272	.786	-.632	.480	.516	-.034	-.027	.166	6.023
	Horizontal & Informal	.216	.235	.179	.922	.360	-.252	.685	.521	.113	.092	.266	3.753
6	(Constant)	14.106	13.567		1.040	.302	-12.990	41.203					
	Climate	.470	.398	.472	1.179	.243	-.326	1.265	.571	.145	.119	.063	15.810
	Comm w/Sup	.094	.295	.092	.318	.751	-.494	.682	.538	.039	.032	.122	8.194
	Org Integration	.212	.323	.143	.658	.513	-.432	.856	.464	.081	.066	.216	4.634
	Media Quality	-.083	.279	-.073	-.297	.768	-.641	.475	.516	-.037	-.030	.166	6.028
	Horizontal & Informal	.170	.242	.141	.700	.486	-.314	.654	.521	.087	.070	.252	3.976
	Org Perspective	-.234	.288	-.185	-.813	.419	-.809	.341	.424	-.100	-.082	.196	5.114
7	(Constant)	10.006	13.530		.740	.462	-17.023	37.034					
	Climate	.588	.397	.591	1.482	.143	-.205	1.381	.571	.182	.147	.062	16.256
	Comm w/Sup	.157	.292	.154	.539	.592	-.425	.740	.538	.067	.053	.120	8.314

Org Integration	.377	.330	.253	1.143	.257	-.282	1.036	.464	.141	.113	.199	5.018
Media Quality	-.060	.275	-.053	-.219	.827	-.609	.489	.516	-.027	-.022	.166	6.041
Horizontal & Informal	.220	.240	.182	.917	.363	-.259	.699	.521	.114	.091	.248	4.030
Org Perspective	-.291	.285	-.230	-1.021	.311	-.859	.278	.424	-.127	-.101	.193	5.177
Personal Feedback	-.345	.191	-.340	-1.806	.076	-.726	.037	.393	-.220	-.179	.276	3.626

a. Dependent Variable: Individual WE Percent Score

Increasing the sample size or eliminating predictor variables are two suggested ways of dealing with multicollinearity, both of which are problematic (Field, 2013; Winship & Western, 2016). Even if it is possible to increase the sample size, according to Winship and Western (2016), model specificity, along with or in exclusion of sampling error, could be contributing to the presence of multicollinearity. Field (2013) notes that a major issue associated with eliminating predictor variables when dealing with multicollinearity is that there is no way to accurately determine which predictor or predictors to eliminate.

The CSQ participant scores for each of the seven CSQ factors were derived by compiling the answers to specific questions in the participants' modified CSQ surveys (Downs & Adrian, 2004). Pearson's *r* correlation coefficients analysis and simple linear regression analysis have already established the likelihood of a predictive relationship between individual participant CSQ scores and individual participant UWES-9 (Schaufeli et al., 2006) scores. Consequently, the evidence of multicollinearity among the predictor variables in the multiple linear regression makes it necessary to acknowledge that the multiple regression model using the CSQ factors as predictors is not a confidently reliable model (Field, 2013).

Analysis of Survey Responses Relevant to Research Question R_2

Pearson's *r* correlation coefficient analysis and simple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were used in the analysis of data relevant to research question R_2: Is there a significant relationship between employee work engagement and job performance? Table 21 shows the Pearson's *r* correlation coefficients (Field, 2013; Urdan, 2010) for the teams' UWES-9 team scores and the teams' three-week average first-pass yield scores (Marr, 2013). The Pearson correlation coefficients are -0.716, indicating that there may be a negative

relationship between the UWES-9 team scores and the teams' three-week average first-pass yield scores. However, the levels of significance are 0.173, indicating that the correlation between the variables is not significant (Field, 2013; Urdan, 2010).

Table 21 Pearson's *r* Correlation Coefficients for the UWES-9 Team Scores and Teams' Three-Week Average First-Pass Yield Scores

Correlation

		Team WE % Scores	Team Yield
Team WE % Scores	Pearson Correlation	1	-.716
	Sig. (2-tailed)		.173
	N	5	5
Team Yield	Pearson Correlation	-.716	1
	Sig. (2-tailed)	.173	
	N	5	5

Table 22 shows the Pearson's *r* correlation coefficients (Field, 2013; Urdan, 2010) for the individual participant UWES-9 percentage scores and the teams' three-week average first-pass yield scores. The Pearson correlation coefficients are 0.738, indicating that there may be a positive relationship between the individual participant UWES-9 scores and the teams' three-week average first-pass yield scores. However, the levels of significance are 0.154, indicating that the correlation between the variables is not significant (Field, 2013; Urdan, 2010).

Table 22 Pearson's *r* Correlation Coefficients for the Individual Participant UWES-9 Scores and Teams' Three-Week Average First-Pass Yield Scores

Correlation

		Individual WE Percent Score	Team Yield
Individual WE Percent Score	Pearson Correlation	1	.738
	Sig. (2-tailed)		.154
	N	72	5
Team Yield	Pearson Correlation	.738	1
	Sig. (2-tailed)	.154	
	N	5	5

Table 23 shows a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) using the teams' UWES-9 team scores as the predictor variable and the teams' three-week average first-pass yield scores as the outcome variable. The R^2 value in the Model Summary is 0.513 and the adjusted R^2 value is 0.351. The *F*-ratio's associated significance value is 0.173 and the *b*-value statistic's associated significance value is 0.090. These two values are greater than the recommended upper limit of 0.050 necessary to provide reasonable confidence that the model is a better predictor than simply by chance (Field, 2013). These values indicate that this regression model cannot be confidently viewed as a reliable predictor (Field, 2013) of three-week average first-pass yield scores.

Table 23 Simple Linear Regression Analysis Using Team UWES-9 Scores as the Predictor and Team Three-Week Average First-Pass Yield Scores as the Outcome

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.716[a]	.513	.351	.00183422667

a. Predictors: (Constant), Team WE % Scores

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	1	.000	3.164	.173[b]
	Residual	.000	3	.000		
	Total	.000	4			

a. Dependent Variable: Team Yield

b. Predictors: (Constant), Team WE % Scores

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	100.015	.012		8105.359	.000
	Team WE % Scores	.000	.000	-.716	-1.779	.173

a. Dependent Variable: Team Yield

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	100.015	-.003[b]	.031[b]	.017[b]	99.973[b]	100.067[b]
	Team WE % Scores	.000	4.843E-5[b]	.001[b]	.090[b]	-.001[b]	.000[b]

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

b. Based on 987 samples

Table 24 shows a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) using the individual participant UWES-9 percentage scores as the predictor

variable and the teams' three-week average first-pass yield scores as the outcome variable. The R^2 value is a 0.545 and the adjusted R^2 value is 0.393. Both the *F*-ratio's associated significance value of 0.154 and the *b*-value statistic's associated significance value of 0.140 are greater than the recommended upper limit of 0.050 (Field, 2013). These values indicate that this regression model cannot be confidently viewed as a reliable predictor (Field, 2013) of three-week average first-pass yield scores.

Table 24 Simple Linear Regression Analysis Using Individual Participant UWES-9 Scores as the Predictor and Team Three-Week Average First-Pass Yield Scores as the Outcome

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.738[a]	.545	.393	.00177319435

a. Predictors: (Constant), Individual WE Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	1	.000	3.595	.154[b]
	Residual	.000	3	.000		
	Total	.000	4			

a. Dependent Variable: Team Yield

b. Predictors: (Constant), Individual WE Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	99.988	.003		35977.104	.000
	Individual WE Percent Score	8.418E-5	.000	.738	1.896	.154

a. Dependent Variable: Team Yield

Bootstrap for Coefficients

Model		Bootstrap[a]					
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	99.988	-.001[b]	.015[b]	.023[b]	99.975[b]	99.990[b]
	Individual WE Percent Score	8.418E-5	1.998E-5[b]	.000[b]	.140[b]	.[b]	.[b]

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

b. Based on 990 samples

The results of the Pearson's *r* correlation analyses and the simple linear regression analyses described in Tables 21 through 24 above can be interpreted as indications of imprecise fit (Field, 2013; Urdan, 2010). Field (2013) defines fit as the "degree to which a statistical model is an accurate representation of some observed data" (p. 875). Many researchers note that statistical significance estimates derived from data generated by small sample sizes may not always produce reliable results in Pearson's *r* or linear regression models (Bates, Zhang, Dufek, & Chen, 1996; Field, 2013; Patten, 2012; Urdan, 2010). Typically, the larger the sample size the more likely the estimates of statistical significance generated by a model will be valid (Bates et al., 1996; Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010). It is possible that the small sample sizes, particularly those of the UWES-9 teams' scores and the teams' three-week average first-pass yield scores, both of which have a sample size of only 5, may be adversely affecting the fit of the models (Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010).

Additionally, the R Square values (Field, 2013; Urdan, 2010) and the Standard Error of the Estimate values (Field, 2013; Lane, 2017) in the two regression models give reason to suspect that a larger sample size may improve the fit of the models. As a general rule, the larger the R Square value in regression, the greater the amount of variation accounted for by the model (Field, 2013; Urdan, 2010). Similarly, the smaller the Standard Error of the Estimate in regression, the more accurate the model (Lane, 2017). In this instance, it appears that the sample size is not sufficient to establish a good fit (Field, 2013; Patten, 2012; Urdan, 2010).

Analysis of Survey Responses Relevant to Research Question R_3

Pearson's *r* correlation coefficient analysis and simple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were used in the analysis of data relevant to research question R_3: Is there a significant relationship between employee communication satisfaction and job performance? Table 25 shows the Pearson's *r* correlation coefficients (Field, 2013; Urdan, 2010) for the CSQ team scores and the teams' three-week average first-pass yield scores (Marr, 2013). The Pearson correlation coefficients are -0.772, indicating that there may be a negative relationship between the CSQ team scores and the teams' three-week average first-pass yield scores. However, the levels of significance are 0.126, indicating that the correlation between the variables is not significant (Field, 2013; Urdan, 2010).

Table 25 Pearson's *r* Correlation Coefficients for the CSQ Team Scores and Teams' Three-Week Average First-Pass Yield Scores

Correlation

		Team CSQ % Scores	Team Yield
Team CSQ % Scores	Pearson Correlation	1	-.772
	Sig. (2-tailed)		.126
	N	5	5
Team Yield	Pearson Correlation	-.772	1
	Sig. (2-tailed)	.126	
	N	5	5

Table 26 shows the Pearson's *r* correlation coefficients (Field, 2013; Urdan, 2010) for the individual participant CSQ percentage scores and the teams' three-week average first-pass yield scores. The Pearson correlation coefficients are 0.458, indicating that there may be a positive relationship between the individual participant CSQ percentage scores and the teams' three-week

average first-pass yield scores. However, the levels of significance are 0.438, indicating that the correlation between the variables is not significant (Field, 2013; Urdan, 2010).

Table 26 Pearson's *r* Correlation Coefficients for the Individual Participant CSQ Scores and Teams' Three-Week Average First-Pass Yield Scores

Correlation

		Individual CSQ Percent Score	Team Yield
Individual CSQ Percent Score	Pearson Correlation	1	.458
	Sig. (2-tailed)		.438
	N	72	5
Team Yield	Pearson Correlation	.458	1
	Sig. (2-tailed)	.438	
	N	5	5

Table 27 shows a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) using the teams' CSQ team scores as the predictor variable and the teams' three-week average first-pass yield scores as the outcome variable. The value of R^2 is 0.596 which would tend to indicate a reliable model (Field, 2013). However, both the *F*-ratio's associated significance value of 0.126 and the *b*-value statistic's associated significance value of 0.155 are greater than the recommended upper limit of 0.050 (Field, 2013). These values indicate that this regression model is not likely to be a reliable predictor (Field, 2013) of teams' three-week average first-pass yield scores.

Table 27 Simple Linear Regression Analysis Using Team CSQ Scores as the Predictor and Team Three-Week Average First-Pass Yield Scores as the Outcome

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.772[a]	.596	.461	.00167201093

a. Predictors: (Constant), Team CSQ % Scores

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	1	.000	4.418	.126[b]
	Residual	.000	3	.000		
	Total	.000	4			

a. Dependent Variable: Team Yield

b. Predictors: (Constant), Team CSQ % Scores

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	T	Sig.
1	(Constant)	100.006	.006		15990.153	.000
	Team CSQ % Scores	.000	.000	-.772	-2.102	.126

a. Dependent Variable: Team Yield

Bootstrap for Coefficients

			Bootstrap[a]				
						BCa 95% Confidence Interval	
Model		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	100.006	.000[b]	.009[b]	.017[b]	99.983[b]	100.022[b]
	Team CSQ % Scores	.000	-9.518E-6[b]	.000[b]	.155[b]	.000[b]	6.014E-5[b]

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

b. Based on 992 samples

Table 28 shows a simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) using the individual participant CSQ percentage scores as the predictor variable

and the teams' three-week average first-pass yield scores as the outcome variable. The value of R^2 is 0.210 which would tend to indicate an unreliable model (Field, 2013). Combined with the *F*-ratio's associated significance value of 0.438 and the *b*-value statistic's associated significance value of 0.385, these values indicate that this regression model is not a reliable predictor (Field, 2013) of teams' three-week average first-pass yield scores.

Table 28 Simple Linear Regression Analysis Using Individual Participant CSQ Scores as the Predictor and Team Three-Week Average First-Pass Yield Scores as the Outcome

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.458[a]	.210	-.053	.00233666328

a. Predictors: (Constant), Individual CSQ Percent Score

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	1	.000	.798	.438[b]
	Residual	.000	3	.000		
	Total	.000	4			

a. Dependent Variable: Team Yield

b. Predictors: (Constant), Individual CSQ Percent Score

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	99.990	.004		27491.136	.000
	Individual CSQ Percent Score	4.422E-5	.000	.458	.893	.438

a. Dependent Variable: Team Yield

Bootstrap for Coefficients

Model			Bootstrap[a]				
						BCa 95% Confidence Interval	
		B	Bias	Std. Error	Sig. (2-tailed)	Lower	Upper
1	(Constant)	99.990	.005[b]	.040[b]	.012[b]	99.988[b]	100.015[b]
	Individual CSQ Percent Score	4.422E-5	-5.909E-5[b]	.000[b]	.385[b]	-.001[b]	9.392E-5[b]

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

b. Based on 981 samples

There appears to be an issue with model fit associated with the results of the analyses of survey responses relevant to research question R_3. The issue appears to be similar to the analyses of the survey responses relevant to research question R_2, and may be a result of a small sample size. In particular, the sample size of 5 for the teams' three-week average first-pass yield scores, which may be adversely affecting the fit of the models (Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010). One solution for improving the fit of the models may be collecting a larger sampling of teams (Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010).

Analysis of Survey Responses Relevant to Research Question R_4

Multivariate analysis of variance, MANOVA, and a follow up discriminant function analysis (Field, 2013) were used to examine the collected data relevant to research question R_4, "Is there a significant difference in levels of communication satisfaction, work engagement, and job performance between sample populations in the workplace?" The MANOVA was conducted using the team assignments of each case in the data set as the independent, or predictor, variables. The dependent, or outcome, variables were the individual CSQ scores, the individual UWES-9 scores, and the combined three-week average first-pass yield scores.

Following the procedures in MANOVA testing in SPSS as suggested by Field (2013) results in three tables: the Multivariate Tests table, the Levene's Test of Equality of Error Variances table, and the Tests of Between-Subjects Effects table. The Levene's Test of Equality of Error Variances table and the Tests of Between-Subjects Effects table are both, according to Field (2013), univariate statistics and are not useful in interpreting the results of the multivariate analysis. Nonetheless, the Levene's Test of Equality of Error Variances is still a useful to tool in

for ensuring that the variances in the different groups used as the dependent variables are approximately equal (Field, 2013; Hinkle et al., 2002). Table 29 shows the Levene's Test of Equality of Error Variances using the individual work engagement percent scores, the individual CSQ percent scores, and the team individual yield scores as the dependent variables. The significance values of 0.140 and 0.422 respectively for the individual work engagement percent scores and the individual CSQ percent scores, are both greater than 0.05, thus indicating homogeneity of variance between the groups (Field, 2013).

Table 29 The Levene's Test of Equality of Error Variances using the individual work engagement percent scores, the individual CSQ percent scores, and the team individual yield scores as the dependent variables

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Individual WE Percent Score	1.797	4	67	.140
Individual CSQ Percent Score	.984	4	67	.422
Team Indv Yield	.	4	67	.

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + team

Field (2013) still suggests relying most heavily on the Multivariate Tests table for indications of significant differences between the groups and following up with a discriminant functional analysis for indications of the nature of the differences. Table 30 shows the Multivariate Tests table from the MANOVA, in which the independent, or predictor, variables were the team assignments and the dependent, or outcome, variables were the individual CSQ scores, the individual UWES-9 scores, and the combined three-week average first-pass yield

scores. The significance values of the four multivariate test statistics for Team Effect, Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root (Field, 2013), are of interest. Significance values of < 0.050 indicate statistically significant differences between the teams (Field, 2013). In this instance, the Team Effect values of 0.007 for Pillai's Trace, 0.005 for Wilks' Lambda, 0.003 for Hotelling's Trace, and < 0.001 for Roy's Largest Root, all indicate that there are statistically significant differences between the teams with relation to individual CSQ scores, individual UWES-9 scores, and the combined three-week average first-pass yield scores (Field, 2013).

Table 30 The Multivariate Tests Table from the MANOVA using Team Assignments as Predictors and Individual CSQ scores, Individual UWES-9 Scores, and the Combined Three-Week Average First-Pass Yield Scores as the Outcomes

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.947	584.416[b]	2.000	66.000	.000
	Wilks' Lambda	.053	584.416[b]	2.000	66.000	.000
	Hotelling's Trace	17.710	584.416[b]	2.000	66.000	.000
	Roy's Largest Root	17.710	584.416[b]	2.000	66.000	.000
Team	Pillai's Trace	.284	2.768	8.000	134.000	.007
	Wilks' Lambda	.720	2.941[b]	8.000	132.000	.005
	Hotelling's Trace	.383	3.110	8.000	130.000	.003
	Roy's Largest Root	.368	6.160[c]	4.000	67.000	.000

a. Design: Intercept + team

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

The follow-up discriminant functional analysis (Field, 2013) set up to use the team assignments as the grouping variable and the individual CSQ scores, the individual UWES-9 scores, and the combined three-week average first-pass yield scores as the independents. Table

31 shows the first table displayed in the SPSS results of the analysis, the Variables Failing Tolerance Test. This test indicates that the combined three-week average first-pass yield scores did not pass the tolerance test requirements of the analysis and were not included. According to Field (2013), tolerance is a measure of collinearity and SPSS requires the tolerance value to be > 0.001 to be acceptable for use in discriminant functional analysis.

Table 31 Variables Failing Tolerance Test Table from the Discriminant Functional Analysis Using Team Assignment as the Grouping Variable and Individual Participant CSQ Scores, Individual UWES-9 Scores, and Combined Three-Week Average First-pass Yield Scores as the Independents

Variables Failing Tolerance Test[a]

	Within-Groups Variance	Tolerance	Minimum Tolerance
Team Indv Yield	.000	.000	.000

All variables passing the tolerance criteria are entered simultaneously.

a. Minimum tolerance level is .001.

With the omission of the team yield scores, the analysis, as shown in Table 32 focused on the remaining two discriminant functions, the individual CSQ scores and the individual UWES-9 scores. Whereas function 1 was found to explain 96.1% of the variance, canonical $R^2 = 0.269$, function 2 was found to explain only 3.9% of the variance, canonical $R^2 = 0.014$. Taken together, these two functions significantly differentiated the teams, Wilks' Lambda = 0.720, chi-square (8) = 22.143, $p = 0.005$. Removing function 1, however, showed that function 2 was not a significant differentiator of the teams, Wilks' Lambda = 0.985, chi-square (3) = 1.004, $p = 0.800$. The values in the Structure Matrix table of Table 31 show the correlation between the discriminant functions and the outcomes loaded unevenly for both outcomes, with individual

CSQ scores registering $r = 0.908$ for function 1 and $r = 0.419$ for function 2. The individual WE scores registered $r = 0.172$ for function 1 and $r = 0.985$ for function 2. The values shown in the Functions at Group Centroids table indicate that function 1 discriminated teams 1, 2, and 3 from teams 4 and 5 and that function 2 discriminated teams 1 and 4 from teams 2, 3, and 5. Taken together, the results of the discriminant functional analysis indicate that it is possible to separate the teams based on multiple predictors (Field, 2013).

Table 32 Eigenvalues, Wilks' Lambda, Structure Matrix, Canonical Discriminant Function Coefficients, and Functions at Group Centroids Tables from the Discriminant Functional Analysis Using Team Assignment as the Grouping Variable and Individual Participant CSQ Scores and Individual UWES-9 Scores as the Independents

Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.368[a]	96.1	96.1	.519
2	.015[a]	3.9	100.0	.122

a. First 2 canonical discriminant functions were used in the analysis.

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 2	.720	22.143	8	.005
2	.985	1.004	3	.800

Structure Matrix

	Function	
	1	2
Individual CSQ Percent Score	.908*	.419
Individual WE Percent Score	.172	.985*

Pooled within-groups correlation between discriminating variables and standardized canonical discriminant functions

Variables ordered by absolute size of correlation within function.

*. Largest absolute correlation between each variable and any discriminant function

Canonical Discriminant Function Coefficients

	Function	
	1	2
Individual CSQ Percent Score	.074	-.013
Individual WE Percent Score	-.022	.048
(Constant)	-3.734	-1.766

Unstandardized coefficients

Functions at Group Centroids

	Function	
Team	1	2
1	.328	.175
2	.632	-.131
3	.682	-.001
4	-.422	.088
5	-.783	-.117

Unstandardized canonical discriminant functions evaluated at group means

Summary

This Chapter described the statistical assessments used to analyze the data collected for the study with relation to the reliability of the survey instruments, the normality of the data, and each of the four research questions. Cronbach's alpha reliability coefficients (Field, 2013; Gliem & Gliem, 2003) calculated for the modified CSQ and the UWES-9 indicated internal consistency of the two survey instruments used in the study. Normality testing (Field, 2013; Ghasemi & Zahediasl, 2012; Leech et al., 2005) of the data sets derived from the modified CSQ and the UWES-9 survey instruments indicated that the data exhibited normal tendencies.

Pearson's *r* correlational analysis (Field, 2013; Urdan, 2010) of the survey responses relevant to research question R_1 indicated large positive correlation between the CSQ and UWES-9 scores, the individual participant CSQ percentage scores and the individual participant UWES-9 percentage scores, the team CSQ percentage scores and the team UWES-9 percentage scores, and the CSQ factors Climate, Communication with Supervisors, Media Quality, and Horizontal and Informal Communication and the individual UWES-9 scores. The correlation coefficients for the CSQ factors for Organizational Integration and Organizational Perspective

indicate a medium positive correlation between these CSQ factors and the individual UWES-9 scores. The correlation coefficient for the CSQ factor Personal Feedback indicated a small positive correlation between this CSQ factor and the individual UWES-9 scores.

Simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) was used to assess the survey responses relevant to research question R_1. Specifically, could the individual participant UWES-9 percentage scores be used to make reliable predictions about the individual participant CSQ percentage scores; could the individual participant CSQ percentage scores be used to make reliable predictions about the individual participant UWES-9 percentage scores; could the UWES-9 team percentage scores be used to make predictions about the CSQ team percentage scores; and could the individual participant UWES-9 percentage scores be used to make predictions about the individual participant percentage scores for each of the seven CSQ factors. The results indicated that each of the models could be considered to be significantly better than chance at predicting outcomes of the dependent variables (Field, 2013).

Pearson's *r* correlational analysis (Field, 2013; Urdan, 2010) and simple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were used to assess the survey responses relevant to research question R_2. In each of the four models described, the p-values indicated that the models could not be considered reliable (Field, 2013; Hinkle et al., 2002; Urdan, 2010). It may be that the p-values in the models were influenced by small sample sizes (Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010) and that a larger sampling may offer a solution for improving the fit of the models.

MANOVA, and a follow up discriminant function analysis (Field, 2013) were used to examine the collected data relevant to research question R_4. The MANOVA indicated homogeneity of variance and evidence of statistically significant differences between the teams

with relation to individual CSQ scores, individual UWES-9 scores, and the combined three-week average first-pass yield scores (Field, 2013). A discriminant functional analysis (Field, 2013) used the team assignments as the grouping variable and the individual CSQ scores, the individual UWES-9 scores, and the combined three-week average first-pass yield scores as the independents. The combined three-week average first-pass yield scores did not pass the tolerance test requirements of the analysis (Field, 2013) and were not included in the discriminant analysis. The discriminant analysis did, however, find indications that it is possible to separate the teams based the predictors individual CSQ scores and individual UWES-9 scores (Field, 2013).

CHAPTER V

SUMMARY AND CONCLUSIONS

Introduction

To provide a review of the study in its entirety, this chapter will feature a restatement of the intent of the study and the major methods used. A summary of the results of the data analyses and conclusions drawn from each will also be provided. The chapter will end with a discussion of the implications of the study's finding.

Statement of the Problem

As described in Chapter 1, the purpose of this study was to explore the relationship between communication satisfaction, work engagement, and job performance among employees at an appliance manufacturing facility in the southeast United States. At the time of this study, appliance manufacturing organizations, such as the Company focused on in this study, face many challenges. These include uncertainty in established and emerging markets, intense competition at home and abroad, excess government regulation and taxation, and the attraction and retention of qualified employees (Bakker et al., 2010; Hoske, 2012; McDonald, 2014; "Whirlpool Corporation Reports Third-Quarter 2011 Results," 2011). For many, the need to fully utilize every competitive tool available is perceived as critical to their survival in the marketplace (Wilson, 2010; Womack et al., 1991). Manufacturers are adapting by developing new strategies, formulating nontraditional ways of measuring their operations, and affecting changes they hope

will ensure their successful long-term survival in the increasingly competitive global economy (Lucas & Kirillova, 2011). The study measured two traits, communication satisfaction and individual employee work engagement, among a subset of employees in a high-speed, high-volume manufacturing operation. The intent was to determine if communication satisfaction and individual employee work engagement may be associated with job performance.

The conceptual approach of this study was based on a model of employee engagement and internal corporate communication described by Mary Welch (2011). The model illustrates engagement as the interplay of the two most widely referenced views of engagement (Shuck & Wollard, 2010): the view described by Kahn (1990) and that described by Schaufeli et al. (2002). The Welch model (2011) illustrates internal communication from senior management leadership as a means of conveying the values of the organization to all employees, involving them directly with the organization's goals, and promoting the antecedent variables of engagement. The Welch (2011) model proposes the organizational outcomes of employee engagement to be innovation, competitiveness, and organizational effectiveness. Other researchers (Christian et al., 2011; Kahn, 1990; Macey & Schneider, 2008) suggest that improved job performance may also be a positive organizational outcome related to employee engagement. In line with the Welch (2011) model, the study included job performance as one of the outcomes of engagement as it may be influenced by organizational communication.

Methodology Review

With regard to the intent of the study being an exploration of the relationships between employee satisfaction with the Company's internal employee communications processes,

employee engagement levels, and job performance, the following research questions and attendant research hypotheses were generated:

R_1: Is there a significant relationship between employee communication satisfaction and employee work engagement in the workplace?

H_1: There is a significant relationship between employee communication satisfaction and employee work engagement.

R_2: Is there a significant relationship between employee work engagement and job performance?

H_2: There is a significant relationship between employee work engagement and job performance.

R_3: Is there a significant relationship between employee communication satisfaction and job performance?

H_3: There is a significant relationship between employee communication satisfaction and job performance.

R_4: Is there a significant difference in levels of employee communication satisfaction, employee work engagement, and job performance between sample populations in the workplace?

H_4: There is a significant difference in levels of employee communication satisfaction, employee work engagement, and job performance between sample populations in the workplace.

Data were collected from five similar work teams from separate product assembly lines and explored for findings relevant to the study's research questions. The data collection instruments were a modified version of the Downs and Hazen Communication Satisfaction Questionnaire, referred to as the CSQ, (Downs & Adrian, 2004) and the nine-question Utrecht Work Engagement Scale, referred to as the UWES-9 (Schaufeli et al., 2006). Job performance

ratings for each team were measured using a three-week average first-pass yield scores (Marr, 2013) derived from the end of assembly functional test areas for each of the work teams.

The software program Statistical Package for the Social Sciences (SPSS) for Windows, Release Version 24.0, was used to conduct the statistical analyses. Cronbach's alpha statistic (Field, 2013; Gliem & Gliem, 2003) was used to validate the internal consistency and reliability of the collected data. Numerical and graphical methods were used to assess the approximate normal distribution of the modified CSQ and UWES-9 data sets (Field, 2013; Ghasemi & Zahediasl, 2012; Leech et al., 2005; Razali & Wah, 2011). Each of the study's four research questions were explored using Pearson's *r* correlation coefficient testing, simple linear regression, multiple linear regression, and MANOVA analysis techniques (Alreck & Settle, 2003; Field, 2013; Hinkle et al., 2002; Urdan, 2010).

Summary of and Conclusions from the Analyses

This section will summarize the results of and conclusions from the analyses described in the previous chapter. The results of the analysis of the data pertinent to each of the four research questions will be summarized in turn. Each summary will include the conclusions drawn from the analysis with respect to the research hypothesis.

Summary and Conclusions: Analysis of Survey Responses Relevant to Research Question R_1

Pearson's *r* (Field, 2013; Urdan, 2010), simple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010), and multiple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were the statistical analysis tools used to analyze the data relevant to this question. Pearson's *r* correlation coefficients were derived using nine variable combinations from the data

set to examine for the possibility of linear relationships between the variable combinations (Field, 2013; Urdan, 2010). These variable combinations were individual participant CSQ scores and individual participant UWES-9 scores, CSQ team scores and UWES-9 team scores, and the individual participant scores for each of the seven CSQ factors and the individual participant UWES-9 scores. Ten separate simple linear regression analyses (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were conducted to examine for evidence of predictive relationships between pairs of variables. Listing the predictor variable first in each combination, the first three variable combinations were participant UWES-9 scores and participant CSQ scores, participant CSQ scores and participant UWES-9 scores, and UWES-9 team scores and CSQ team scores. The remaining seven variable combinations used participant UWES-9 scores as the predictor variable and one of the seven participant CSQ factor scores as the dependent variable. In the multiple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) the predictor variables were the individual participant CSQ scores for each of the seven CSQ factors. The individual participant UWES-9 percentage scores represented the outcome variable.

The correlational coefficients and p-values generated by the Pearson's *r* analyses (Field, 2013; Hinkle et al., 2002) provided indications of large positive correlation in the variable combination of the individual participant CSQ scores and individual participant UWES-9 scores, CSQ team scores and UWES-9 team scores, and in the combinations between the individual participant UWES-9 scores and the individual participant CSQ factor scores for the factors Climate, Communication with Supervisors, Media Quality, and Horizontal and Informal Communication. Evidence of medium positive correlation (Field, 2013) was found in the variable combinations of the individual UWES-9 scores and the individual participant CSQ factor scores for the factors Organizational Integration and Organizational Perspective. There

were indications of a small positive correlation (Field, 2013) between individual participant UWES-9 scores and the individual participant CSQ factor scores for the factor Personal Feedback.

The reliability of each of the simple linear regression analyses were assessed using several statistics generated by the SPSS tool. In each instance, the values of the R^2 and adjusted R^2 statistics in relation to the *F*-ratio's significance value and the value of the *b*-value significance were examined. The aim was to find indications of regression models capable of predicting dependent variable outcomes significantly better than chance (Field, 2013). In every variable combination examined, the values of these statistics indicated models that could be considered to be capable of predicting outcomes significantly better than chance (Field, 2013).

The multiple linear regression analysis (Field, 2013; Hinkle et al., 2002; Urdan, 2010) found indications of excessively strong correlation between the predictor variables called multicollinearity (Field, 2013; Urdan, 2010). The strong correlation among the predictor variables that are characteristic of multicollinearity, create serious problems in a model's ability to reliably identify "the unique relation between each predictor variable and the dependent variable" (Urdan, 2010, p. 154). According to Field (2013), a multiple linear regression assessment is rendered practically useless when multicollinearity is present. The presence of multicollinearity among the predictor variables was determined through examination of specific values in the Correlation, and Coefficients tables generated by SPSS in the multiple linear regression analysis (Field, 2013). Specifically, Pearson's *r* values of 0.900 or greater, variable inflation factor (VIF) values greater than 10, and an average value of all of the VIF statistics greater than 1 (Field, 2013). Because of the evidence of multicollinearity among the predictor

variables in the multiple linear regression, the multiple regression model using the CSQ factors as predictors should not be considered a confidently reliable model (Field, 2013).

Even though there was evidence of multicollinearity (Field, 2013) in the multiple regression model using the CSQ factors as predictors, the results of the Pearson's *r* (Field, 2013; Urdan, 2010) analyses did give indications of significant correlation. Additionally, examination of the results of the simple linear regression (Field, 2013; Hinkle et al., 2002; Urdan, 2010) analyses indicated that the tests were a reliable predictive model for the variable combinations used. This evidence suggests that, under the conditions in which this study was conducted, it can be confidently assumed that a significant predictive relationship existed between employee communication satisfaction and employee work engagement.

Summary and Conclusions: Analysis of Survey Responses Relevant to Research Question R_2

The results of Pearson's *r* correlational analyses (Field, 2013; Urdan, 2010) and simple linear regression analyses (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were examined in relation to research question R_2. Pearson's *r* correlation coefficients were derived from two separate variable combinations. These were the UWES-9 team scores and the three-week average first-pass yield scores (Marr, 2013) and the individual participant UWES-9 percentage scores and the three-week average first-pass yield scores. The results of two separate simple linear regression analyses (Field, 2013; Hinkle et al., 2002; Urdan, 2010) were examined for evidence of predictive relationships between pairs of variables. With the predictor variable listed first in each combination, these were UWES-9 team scores and the three-week average first-pass yield scores and individual participant UWES-9 percentage scores and the three-week average first-pass yield scores.

The results of all four analyses provided indications that none of the models could be considered reliable predictors (Field, 2013; Hinkle et al., 2002; Urdan, 2010). In the two Pearson's *r* analyses, absolute values greater than 0.700 for the correlational coefficients and p-values greater than 0.050, indicated that the models could not be considered reliable (Field, 2013; Hinkle et al., 2002). In both of the simple linear regression analyses, the values of the *F*-ratio's significance value and the *b*-value significance were greater than 0.050, likewise indicating unreliable predictive models (Field, 2013; Hinkle et al., 2002; Urdan, 2010).

Further reading into the causes and implications of the findings found research pointing to small sample sizes producing unreliable results in Pearson's *r* and linear regression models (Bates et al., 1996; Field, 2013; Patten, 2012; Urdan, 2010). Researchers noted that the larger the sample size the more likely the estimates of statistical significance generated by a model will be valid (Bates et al., 1996; Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010). In the models used in the examination of data relevant to research question R_2, the UWES-9 teams' scores and the teams' three-week average first-pass yield scores both had a sample size of only 5, which may had adversely affected the fit of the models (Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010). This suspicion was given further credence by the R^2, the adjusted R^2, and the Standard Error of the Estimate values (Field, 2013; Lane, 2017; Urdan, 2010) in the two regression models. The size of the R^2 and adjusted R^2 values appear to indicate large amounts of variation accounted for by the model (Field, 2013; Urdan, 2010). The small Standard Error of the Estimate in the regression models provide indications of accuracy in the models (Lane, 2017). For these reasons, it may be possible that a sample of more than 5 data points per variable could be considered as a method of improving the fit of the models (Field, 2013; Patten, 2012; Urdan, 2010).

The results of the analyses suggest the models used could not be considered reliable predictors (Field, 2013; Hinkle et al., 2002; Urdan, 2010). However, it is possible that sampling error, specifically a small sample size associated with the teams' three-week average first-pass yield scores, may have influenced the fit of the models (Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010) and that a larger sample size might possibly provide a more reliable analysis (Field, 2013; Lane, 2017; Urdan, 2010). Based upon these results, it cannot be determined if it is likely or unlikely that a significant relationship existed between employee work engagement and job performance in the Company's assembly operations at the time of this study.

Summary and Conclusions: Analysis of Survey Responses Relevant to Research Question R_3

Analysis of data relevant to research question R_3 was accomplished using two Pearson's *r* analyses and two simple linear regression analyses (Field, 2013; Hinkle et al., 2002; Urdan, 2010). The variable combinations examined in the Pearson's *r* analyses were the CSQ team scores and the teams' three-week average first-pass yield scores and the individual participant CSQ percentage scores and the teams' three-week average first-pass yield scores. The variable combinations examined in the two simple linear regression analyses, listing the predictor variable first, were the CSQ team scores and the teams' three-week average first-pass yield scores and the individual participant CSQ percentage scores and the teams' three-week average first-pass yield scores.

As with the analyses conducted in relation to research question R_2, the small sample size of the teams' three-week average first-pass yield scores may have influenced the fit of the four models used in the analyses conducted in relation to this research question. The absolute values

were greater than 0.700 for the correlational coefficients and p-values were greater than 0.050 in the two Pearson's *r* analyses (Field, 2013; Hinkle et al., 2002; Urdan, 2010). The *F*-ratio's significance value and the *b*-value significance were greater than 0.050 in both of the simple linear regression models (Field, 2013; Hinkle et al., 2002; Urdan, 2010). While all of these values indicate poor model fit (Field, 2013), the size of the R^2 and adjusted R^2 values (Field, 2013; Urdan, 2010) and of the Standard Error of the Estimate provide indications of some accuracy in the models (Lane, 2017).

Sampling error may also have influenced the fit of the models used in these analyses (Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010). Once again, the poor model fit likely due to the small sample size provided models that could not be considered reliable predictors (Field, 2013; Hinkle et al., 2002; Lane, 2017; Urdan, 2010). As a result, confident determination of any significant relationship between employee communication satisfaction and job performance was not possible.

Summary and Conclusions: Analysis of Survey Responses Relevant to Research Question R_4

The results of multivariate analysis of variance (MANOVA) and discriminant function analysis (Field, 2013) were used to examine the collected data relevant to research question R_4. In the MANOVA, the team assignments of each case in the data set were used as the predictor variables with the individual CSQ scores, the individual UWES-9 scores, and the combined three-week average first-pass yield scores designated as the dependent variables. In the discriminant functional analysis (Field, 2013), the team assignments were assigned as the grouping variable and the individual CSQ scores, the individual UWES-9 scores, and the combined three-week average first-pass yield scores as the independent variables.

In the Levene's Test of Equality of Error Variances table of the MANOVA test, significance values of 0.140 and 0.422 respectively gave indications of homogeneity of variance between the individual work engagement percent scores and the individual CSQ percent scores (Field, 2013). The test did not generate a significance statistic for the combined three-week average first-pass yield scores, presumably due to the small sample size (Field, 2013). The significance values of the four multivariate test statistics in the Multivariate Tests table of the MANOVA suggest statistically significant differences between the teams with relation to individual CSQ scores, individual UWES-9 scores, and the combined three-week average first-pass yield scores (Field, 2013). Where significance values greater than 0.050 are indications of statistically significant differences (Field, 2013), the Team Effect significance values were found to be 0.007 for Pillai's Trace, 0.005 for Wilks' Lambda, 0.003 for Hotelling's Trace, and < 0.001 for Roy's Largest Root.

Although the discriminant functional analysis (Field, 2013) was set up to use the three grouping variables, the combined three-week average first-pass yield scores did not pass the SPSS program's tolerance test requirements of the analysis and were not included. In this instance, tolerance is a measure of collinearity and SPSS requires the tolerance value to be less than 0.001 to be acceptable for use in discriminant functional analysis (Field, 2013). The results of the discriminant functional analysis using the remaining two discriminant functions, the individual CSQ scores and the individual UWES-9 scores, indicated that it is possible to separate the teams based on multiple predictors (Field, 2013).

Errors with the data associated with the teams' three-week average first-pass yield scores appear to have influenced the results of the analysis (Field, 2013). Nevertheless, the results of the analyses do make it possible to draw narrow conclusions with respect to the research

question hypothesis. The analyses do not provide enough evidence to suggest there were significant differences in levels of employee communication satisfaction and employee work engagement between sample populations in the Company's assembly operations at the time of the study. The lack of reliable results, however, make it imprudent to draw any conclusions with regard to the levels of employee job performance.

Discussion

As previously described in Chapter 1, the potential significance of the study lay with its likely potential in helping to meet a need for research into organization-level interventions to promote individual employee work engagement (Bakker et al., 2010). The results of the study might also be useful in suggesting additional avenues for research involving the effects of internal communication and employee work engagement on employee performance in manufacturing operations. Four research questions were generated by the study and data were analyzed relative to each question.

Ultimately, analysis of the data allowed for a confident conclusion to be drawn from only the analysis relative to research question one. In that analysis, the data gives credence to the assumption that a significant relationship, both correlational and predictive, existed between employee satisfaction with communication and employee work engagement in the Company's assembly operations at the time of the study. This finding is in agreement with Welch's (2011) conceptual model of employee engagement and internal corporate communication.

The analyses of the data associated with research questions two and three resulted in strong indications of issues with the data and the statistical models used. Despite the indications of unreliability, however, evidence that a larger sample size might improve the fit and the value

of some of the statistics generated in the analyses created enough uncertainty to prevent stating any conclusive findings regarding the possibility of significant predictive relationships between individual and/or team work engagement and job performance or individual and/or team communication satisfaction and job performance.

In the analyses of the data for research question four, issues with using the three-week average first-pass yield scores as a reliable variable also prevented the drawing of any firm conclusions (Field, 2013; Hinkle et al., 2002; Hopkins, 2000; Patten, 2012; Urdan, 2010). Still, the analyses did find indications of homogeneity of variance and discriminant function between the sample groups in the levels of employee communication satisfaction and employee work engagement. While this too is in agreement with Welch's (2012) conceptual model of employee engagement and internal corporate communication, the question of significant differences in job performance between the groups in relation to communication satisfaction and work engagement remains inconclusively answered.

In the end, the assumption that a sample size of only 5 teams would be of sufficient size appears to have been flawed. The total number of employees surveyed seems to have been sufficient for the measurement and analysis of communication satisfaction and work engagement. However, the use of only 5 data points as the three-week average first-pass yield scores data set created uncertainty in the reliability of the analysis findings. The study did find evidence of predictive relationships between levels of communication satisfaction and work engagement. No firm conclusions could be drawn, however, with regard to predictive relationships between job performance and the two variables of levels of communication satisfaction and work engagement.

Recommendations for Future Study

As the analyses of the data collected for this study have indicated, a larger sample size for three-week average first-pass yield scores will be required to shine a more reliable light on the possible relationships between job performance, communication satisfaction, and work engagement. Other measures might also be developed and deployed for job performance, communication satisfaction, and work engagement to address the research questions posed in this study. Additionally, other aspects of work engagement, such as the effects of work disengagement could be study to determine its potential relationship with job performance and/or communication satisfaction.

The results of this study give credence to the assumption that significant relationships, both correlational and predictive, existed between employee satisfaction with communication and employee work engagement in the Company's assembly operations at the time of the study. This would appear to indicate that the Company's communication practices could considered value-added (Wilson, 2010) with respect to the promotion of employee work engagement. Further study to determine which specific aspects of the Company's communication practices are most effective in promoting work engagement and/or job performance is recommended.

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APPENDIX A

MODIFIED COMMUNICATION SATISFACTION QUESTIONNAIRE

[Company Name] Communication Satisfaction Questionnaire

DIRECTIONS: [company name] strives to make timely and useful communications available to everyone in our organization. Our goal is to ensure all of us have the information we need to be as effective and productive as we can be in our jobs. This questionnaire is intended to help determine team members' levels of satisfaction with [company name]'s communication practices.

Thank you for taking the time to complete this questionnaire. It should only take about 10 or 15 minutes to complete.

You do not need to write your name on this form. Your answers are completely confidential, so please be as honest and open as you wish. This is not a test. Your opinion is the only right answer.

A. Listed below are for demographic purposes to help us better understand the overall results of the questionnaire. Please select the one answer to each of the two questions that best describe you.

1. How long have you worked at [company name]? (Check one)

__1. Less than 1 year
__2. 1 to 2 years
__3. 2 to 5 years
__4. 5 to 10 years
__4. 5 to 10 years
__5. 10 to 15 years
__6. 15 years or more

2. Gender? (Check one)

__1. Female
__2. Male

B. Listed below are several kinds of information often associated with a person's job. Please indicate how satisfied you are with the amount and/or quality of each kind of information by circling the appropriate number at the right.

1 = Very dissatisfied 2 = Dissatisfied 3 = Somewhat dissatisfied 4 = Indifferent
5 = Somewhat satisfied 6 = Satisfied 7 = Very satisfied

3.	Information about my progress in my job.	1	2	3	4	5	6	7
4.	Personnel news.	1	2	3	4	5	6	7
5.	Information about company policies and goals.	1	2	3	4	5	6	7
6.	Information about how my job compares to others.	1	2	3	4	5	6	7
7.	Information about how I am being judged.	1	2	3	4	5	6	7
8.	Recognition of my efforts.	1	2	3	4	5	6	7
9.	Information about departmental policies and goals.	1	2	3	4	5	6	7
10.	Information about the requirements of my job.	1	2	3	4	5	6	7
11.	Information about government regulatory action affecting [the company].	1	2	3	4	5	6	7
12.	Information about changes in [the company].	1	2	3	4	5	6	7
13.	Reports on how problems in my job are being handled.	1	2	3	4	5	6	7
14.	Information about employee benefits and pay.	1	2	3	4	5	6	7
15.	Information about the company's financial standing.	1	2	3	4	5	6	7
16.	Information about achievements and/or failures of the organization.	1	2	3	4	5	6	7

C. Please indicate how satisfied you are with the following by circling the appropriate number at the right.

1 = Very dissatisfied 2 = Dissatisfied 3 = Somewhat dissatisfied 4 = Indifferent
5 = Somewhat satisfied 6 = Satisfied 7 = Very satisfied

17.	Extent to which my leaders understand the problems faced by employees.	1	2	3	4	5	6	7
18.	Extent to which [company name]'s communication motivates me to meet its goals.	1	2	3	4	5	6	7
19.	Extent to which my leaders listen and pay attention to me.	1	2	3	4	5	6	7
20.	Extent to which the people at [company name] have great ability as communicators.	1	2	3	4	5	6	7
21.	Extent to which my leaders offer guidance for solving job-related problems.	1	2	3	4	5	6	7
22.	Extent to which communication at [company name] make me identify with it or feel a vital part of it.	1	2	3	4	5	6	7
23.	Extent to which [company name] communications are interesting and helpful.	1	2	3	4	5	6	7
24.	Extent to which my leaders trust me.	1	2	3	4	5	6	7
25.	Extent to which I receive in time the information needed to do my job.	1	2	3	4	5	6	7
26.	Extent to which conflicts are handled appropriately through proper communication channels.	1	2	3	4	5	6	7
27.	Extent to which the grapevine (the rumor mill) is active at [company name].	1	2	3	4	5	6	7
28.	Extent to which my leaders are open to ideas.	1	2	3	4	5	6	7
29.	Extent to which communication with other employees at my level is accurate and free-flowing.	1	2	3	4	5	6	7
30.	Extent to which communication practices are adaptable to emergencies.	1	2	3	4	5	6	7
31.	Extent to which my team is compatible.	1	2	3	4	5	6	7
32.	Extent to which our meetings are well organized.	1	2	3	4	5	6	7
33.	Extent to which the amount of supervision given me is about right.	1	2	3	4	5	6	7
34.	Extent to which written directives and reports are clear and concise.	1	2	3	4	5	6	7
35.	Extent to which the attitudes toward communication at [company name] are basically healthy.	1	2	3	4	5	6	7
36.	Extent to which informal communication is active and accurate.	1	2	3	4	5	6	7
37.	Extent to which the amount of communication at [company name] is about right.	1	2	3	4	5	6	7

APPENDIX B

NINE QUESTION VERSION OF THE UTRECHT WORK ENGAGEMENT SCALE

[Company Name] Work Engagement Survey

Thank you for taking the time to complete this questionnaire. It should only take about 5 or 10 minutes to complete.

You do not need to write your name on this form. Your answers are completely confidential, so please be as honest and open as you wish. This is not a test. Your opinion is the only right answer.

The first two questions are for demographic purposes to help us better understand the overall results of the questionnaire.

How long have you worked at [company name]? (Check one)

__1. Less than 1 year
__2. 1 to 2 years
__3. 2 to 5 years
__4. 5 to 10 years
__5. 10 to 15 years
__6. 15 years or more

2. Gender? (Check one)

__1. Female __2. Male

The following 9 statements are about how you feel at work. Please read each statement carefully and decide if you ever feel this way about your job. If you have never had this feeling, check the box for "0" (zero) in the space after the statement. If you have had this feeling, indicate how often you felt it by checking the box for the number (from 1 to 6) that best describes how frequently you feel that way.

Never	Almost Never	Rarely	Sometimes	Often	Very Often	Always
0	1	2	3	4	5	6
Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Every day

	0	1	2	3	4	5	6
1. At my work, I feel bursting with energy.							
2. At my job, I feel strong and vigorous.							
3. I am enthusiastic about my job.							
4. My job inspires me.							
5. When I get up in the morning, I feel like going to work.							
6. I feel happy when I am working intensely.							
7. I am proud of the work that I do.							
8. I am immersed in my work.							
9. I get carried away when I am working.							

VITA

Scott Lee Reece was born on November 30, 1957, to Jerry Wayne and Mary Louise Reece. Growing up in eastern Missouri, Scott attended Parma Elementary, Hancock Place Elementary and Junior High School, North Pemiscot High School, and graduated from Parma High School in 1975. After a brief stint in the United States Army, Scott attended Southeast Missouri State University where he was active in the University's student-led radio and television programs. In May 1983 Scott was awarded a Bachelor of Science degree in Communication-Electronic with a minor in Speech, as well as a Bachelor of Arts degree in Speech Communication with a minor in Journalism. After completing his undergraduate studies, Scott worked for a short time as a professional carpenter and an over-the-road trucker before taking on the role of News Director at an AM/FM combo radio station in Sikeston, MO, where he was responsible for five hours of news and public affairs programming each day. In 1988 Scott accepted a position as a graduate assistant at the University of Mississippi-Oxford, where he taught introductory broadcast journalism courses and assisted the University in establishing the news department of its new commercial radio station. In 1990, Scott graduated from the University of Mississippi with a Master of Arts in Journalism, minoring in Political Science. In 1990 Scott joined the staff of Tel-A-Train, a video-based training provider, in Chattanooga, TN, as a writer-producer. In 1994 he began working for Roper Corporation, in LaFayette, GA, where he currently serves as the Organizational Development Leader.