INNOVATION TEAMS: AN EMPIRICAL EXAMINATION OF THE RELATIONSHIP OF TEAM CLIMATE AND DEVELOPMENT STRATEGIES IN CONSUMER PACKAGED GOODS INDUSTRIES

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Companies’ new primary source for sustainable revenue growth comes from creating new innovations, rather than from mergers and acquisitions. Companies are finding it difficult to align internal support for the innovative creativity of teams with standard operating procedures. This research aims to discover how innovative teams contribute to forming development strategies that CPG firms use to create new products.

Dimensions of the Theory of Team Climate in Innovation (TTCI) offer insight on the dimensions of development strategy. Specifically, by integrating the theories, a proposed model identifies the innovation team’s impact on the firm’s development strategies. Such understanding has the potential to increase firm profits, lower innovation costs, increase innovation speed, and support innovation training. To empirically test this model, employees responsible for product development in the consumer packaged goods (CPG) industries were surveyed. Structural modeling techniques were used to analyze the data. Findings indicate support for using TTCI to explain the compressed development strategy.

Theoretical contributions include: 1) extending TTCI and its associated measures into tangible products industries, 2) refining and adding to TTCI measures, 3) extending the development strategies theory into tangible products industries, and 4) adding to the measures for development strategy. Future research appears fertile for methods and measures used in this study, and managers in CPG will benefit from an enhanced understanding of how to better structure innovation teams in alignment with a firm’s development strategy.
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CHAPTER 1

BACKGROUND AND CONCEPTUAL FRAMEWORK

Overview

Companies are finding that their new primary source for sustainable revenue growth comes from creating new innovations, not from mergers and acquisitions (Leavy 2005). In the consumer packaged goods industry, the cost by manufactures and distributors that pay slotting allowances to retailers exceeds $6 billion in shareholder waste on failed new products (Katz and Green 2010). To expedite creating new products, companies find it difficult to align internal support for innovative creativity with the company’s standard operating procedures (Barczak, Griffin, and Kahn 2009). This research aims to discover how teams contribute to forming the development strategies that firms use to create new innovations. A model that can help a company identify a team’s impact on a firm’s development strategies would help increase their profits, lower costs of innovation, increase knowing how to speed up innovation, and aid companies in training new employees to work on new innovations.

Role of Team Climate in Innovation

A marketing team can send tremors of fear or thrills of hope throughout a company (Mcgregor et al. 2010), and the value of the marketing team in the development of new innovations is extensively discussed in the literature. The marketing team’s connection to a company’s performance was established early in marketing field publications (Alderson 1957/2009; Christian 1959b; Green 1960; Hunt 1973; Lazer et al. 1959; Levitt 1960; Marler-Jr.
These early scholars in marketing made it clear that a company must understand that the team is essential to have marketing success.

Marketing literature extensively explains the marketing team’s influence on the success or failure of new product or service innovations; however, recent comprehensive reviews are illusive for readers to find (Christian 1961; Christian 1959a; Christian 1959b; Connolly, Demas, and Bobbe 1979; Cooper 1979; Cooper 1980; Cooper 1975; Cooper 1976; Cooper and Kleinschmidt 1995a; Dillon, Calantone, and Worthing 1979; Glynn, Kazanjian, and Drazin 2010; Gordon and Gearth 1971; Haley and Harper Jr 1976; Hardin and Marquardt 1967; Hill and Hlavacek 1972; Kotler 2003; Kotler 1972; Kotler and Keller 2007; Ladik, Kent, and Nahl 1960; Lazer et al. 1959; Levitt 1960; Luck 1969; Murphy 1962; Parker 1960; Revilla and Rodriguez 2011; Rodriguez-Escudero, Carbonell, and Munuera-Aleman 2010; Sivakumar and Cheryl 1999; Uman 1971). Separately, these marketing researchers identify various independent, isolated aspects of the marketing team’s impact on innovation success (Ailawadi, Neslin, and Gedenk 2001; Bearden, Netemeyer, and Teel 1989; Bruner, Hensel, and James 2005; Costa and Anderson 2011; Costa, Roe, and Taillieu 2001; D’astous and Boujbel 2007; Moorman and Miner 1998; Perkins et al. 2011; Sandberg 2007). This literature review shows that marketing scholars are attempting to assess the marketing team’s climate (MTC) for innovation and to connect MTC to company performance. However, marketing literature lacks a cohesive, comprehensive, multidimensional approach to explain the marketing team’s impact in the climate of working to produce superior new innovations.

In the late 1990s, researchers in both marketing and management examined characteristics of teams. One team characteristic they abundantly studied is trust. Trusting team members to deliver their portion of work on time is a reasonable expectation when improving a
consumer packaged good product. For example, when innovating new mini-sized candies, each team member expects or trusts the other team members to deliver their assigned development tasks on time (Vera and Crossan 2005) for prototype completion so that the firm can produce the new candies to increase revenue from these sales.

During the time when management scholars began studying the relationship between work group characteristics and overall firm performance (Hyatt and Ruddy 1997), marketing scholars inaugurated studying the marketing team’s commitment level to new product development (NPD) projects (Cooper 1975; Day and Nedungadi 1994; Hunt, Chonko, and Wood 1985; Moorman and Miner 1998; Sandberg 2007; Williamson 1983). Marketing scholars, in their attempts to understand marketing teams, took isolated efforts at understanding the team’s contribution to new innovations (Ailawadi et al. 2001; Bruner et al. 2005; Costa and Anderson 2011; Costa et al. 2001; d’Astous and Boujbel 2007; Moorman and Miner 1998; Perkins et al. 2011). These isolated research efforts explain one or two dimensions of a marketing team’s contribution to NPD but do not provide a holistic approach.

At the same time that marketing scholars researched one or two dimensions of team behaviors, psychology and management theorists paved the way for the Theory of Team Climate in Innovation (TTCI) (Agrell and Gustafson 1994; Anderson and West 1998b; West and Farr 1990; West 1994). The TTCI provided researchers with a comprehensive multi-dimensional explanation of the team’s ability to function in a “climate” of innovation (Anderson and West 1999; Anderson and West 1998b; Bain, Mann, and Pirola-Merlo 2001a; Bstieler and Hemmert 2010; Gamero, González-Romá, and Peiró 2008; Weiss, Hoegl, and Gibbert 2011). The perceptions from team members working in a ‘climate’ of innovation is different than perceptions from team members working in a ‘climate’ of safety, research, or distribution (West
and Farr 1990). Researchers can use a 61-item inventory, known as the Team Climate Inventory (TCI), to approximate team climate of innovation in companies (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998b; Bain, Mann, and Pirola-Merlo 2001b; Bain, Mann, and Pirola-Merlo 2001a; Bstieler and Hemmert 2010; Burningham and West 1995; Cooper, Edgett, and Kleinschmidt 2004; Cooper and Kleinschmidt 1995a; Elkins and Keller 2004; Kivimaki and Elovainio 1999; Loo 2003; Troy, Szymanski, and Varadarajan 2001; Tseng, Liu, and West 2009; Weiss, Hoegl, and Gibbert 2011). Researchers can potentially use the TCI to fill any knowledge gaps remaining from previous marketing scholars’ isolated efforts to understand innovation and teams.

Emergence of Development Strategies in Innovation

Until the 1990s, few heated arguments took place in business literature with regard to strategy, what it is, and how it evolves in an organization. In the 1990s, well-known scholars and practitioners published a volley of back and forth discussions that intended to define strategy (Coyne 1997; Hamel 1996; Ketelhohn 1997; Levien 1997; Macmillan and Mcgrath 1997; Porter 1996; Porter 1997; Stalk 1997). These arguments indicate a possible fundamental shift in understanding business strategy, which Eisenhardt confirmed was taking place in the 1990s (Bingham, Eisenhardt, and Furr 2011; Eisenhardt 2001).

Eisenhardt and Tabrizi (1995) created two new models to explain the development strategies internal to a firm’s operations; these new models show the shift in business strategy from an external focus to an internal focus in organizations that innovate. Eisenhardt and Tabrizi (1995) discovered that an organization’s development of new products or services essentially falls into one of two dichotomous dimensions. These two innovation development dimensions
are labeled as either the compressed or experiential models of development strategy by the authors (Eisenhardt and Tabrizi 1995). Their research contrasts these two new theoretical development models to examine and explain a firm’s internal ability to achieve “fast adaptation” through innovation (Eisenhardt and Tabrizi 1995). The compressed model explains that an organization is “compressing” or “shortening” the planned, rationalized process steps for innovation (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995). The experiential model fundamentally sheds light on the ‘experiential’ or ‘intuitive’ approach for innovation (Allingham 2009; Eisenhardt and Tabrizi 1995; Kyriakopoulos 2011; Prahalad and Ramaswamy 2003; Russell 2007).

By understanding that a firm uses either the compressed or the experiential strategy, Eisenhardt and Tabrizi (1995) help company managers audit the firm’s intent in speeding up innovation. Marketing management needs secure ways to audit and find out if the strategy fits the organization (Cespedes and Piercy 1996; Kotler, Gregor, and Rodgers 1977; Taghian and Shaw 2009). For example, management should know the speed of innovation, since speed is a known critical factor for success in certain industries, e.g., technology. Knowing the speed of innovation can assist marketing with securing an advantage against competitors (Bowman and Gatignon 1995; Cohen, Eliashberg, and Ho 1996; Cooper and Kleinschmidt 1994; Cooper and Kleinschmidt 1995b; Eisenhardt 1989; Eisenhardt 1990; Ellis and Curtis 1995; Lynn and Akgun 2003; Lynn, Skov, and Abel 1999; Mcdonough Iii and Barczak 1991; Menon and Lukas 2004). A company that recognizes the characteristics of its development strategy can better control its destiny for speed of innovation.
Outcome and Indicator Variables

Components of Team Climate with dimension of study. This research uses components of the Theory of Team Climate in Innovation (TTCI) that utilize the short version of TCI as indicators. TTCI was originally conceived to explain teams in the climate of innovation in service industries and is comprised of four factors by West (1990). Anderson and West (1998) conducted a comprehensive, multi-dimension, multi-trait empirical research study to test the hypothesized four-factor structure for the TTCI. This research used constructs that match the original four-factor TCI model through the validation by Kivimaki and Elovainio (1999). Kivimaki and Elovainio’s empirical research reduced the original 61 items to what is known today as the TCI short form, which contains 14 items. The rigor by these later scholars confirms TCI consistently and reliably produces four factors for evaluating teams in an innovation climate. These four factors are 1) vision, 2) participative safety, 3) task orientation, and 4) support for innovation (Kivimaki and Elovainio 1999). Figure 1 illustrates this four-factor structure of the TTCI and is adapted from Anderson and West (1998), further supported by Kivimaki and Elovainio (1999). The following sections present each of these factors.

The terms that West and Anderson associate with team vision relate to soliciting information about team members’ views on the clarity, shrewdness, attainability, and value of team objectives (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998b; Anderson and West 1998a; Burningham and West 1995). Vision indicates the extent to which participants feel their team colleagues were in agreement with, and committed to, team objectives (Laverie, Madhavaram, and Mcdonald 2008; Revilla and Rodríguez 2011). Measures
that identify team vision in the climate of innovation include items such as agreeing with objectives, understanding the objectives, and believing the objectives are achievable.

Team participation and the ‘safety’ of working in a team intends that the team is safe in terms of sharing ideas. Questions related to team participation ask participants the perception of their influence over decision making, information sharing, and interaction frequency. West (1990) proposed that people are more likely to participate in the outcomes of team-driven decisions when they share in the information that leads to these decisions (Alexiev et al. 2010; Anderson and Narus 1990; Cooper 1996; Di Benedetto 1999; Eisenhardt 1989; Eisenhardt 1990; Huang, Lin, and Su 2005; Morgan and Hunt 1994; Slotegraaf and Atuahene-Gima 2011; Weiss and Hughes 2005).

The construct of participative safety measures the active involvement in a team where the atmosphere is non-threatening, is supportive, can inspire trust, and, hence, is safe (Costa and Anderson 2011; Elkins and Keller 2004; Hunt, Chonko, and Wood 1985; Lepine et al. 2008; Ravindranath and Rajiv 1998; Sandberg 2007; Smith, Peterson, and Misumi 1994; Smith and Blanck 2002). For example, items that measure participatory safety might include keeping each other informed, feeling understood and accepted, and feeling as if “we are in it together.”

Within a team working in the climate of innovation, the task orientation factor emphasizes the team’s accountability for evaluating and modifying its own performance. West and Anderson (1998) offered the following terms for accountability: being prepared for basic questions on tasks, providing a critical appraisal of weakness in the team, and building on each other’s ideas in the team. This task orientation factor describes a general commitment to excellence in performing tasks coupled with a climate that supports improving established policies, procedures, and methods to produce innovative ideas for the firm to deploy.
Innovation, in its broadest sense, relates to how teams come together to produce a product or service considered highly novel or creative to an industry or to the world (Bain, Mann, and Pirola-Merlo 2001a; Weiss, Hoegl, and Gibbert 2011). Support for innovation is a consistent predictor, and the principal predictor, of group innovation (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998b; Anderson and West 1998a; Bain, Mann, and Pirola-Merlo 2001a; Burningham and West 1995). The paradigm of innovation in the organization is important for model conceptualization.

A gap emerging in this review of innovation literature is that examining work group performance does not include using TCI in tangible products industries. Further, an assertion is that marketing scholars and companies need to understand marketing team climate (MTC) relative to Eisenhardt and Tabrizi’s (1995) new development strategies to reach superior performance goals. Using the Theory of Team Climate in Innovation (TTCI) with its associated index can potentially fill the gap in marketing literature. A discussion about Eisenhardt and Tabrizi’s (1995) new theory in development strategies is warranted.

*Development strategies: compressed, experiential.* Much of the research literature shares a fairly uniform view that marketing strategies are first formulated, and then implemented (Moorman and Miner 1998). Eisenhardt and Tabrizi (1995) studied service industries to break down development strategy internal to the firm’s operations into two dimensions: compressed strategy and experiential strategy. Compressed strategy suggests that innovation development follows along a predictable path with certain process steps to follow (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995). For example, items that measure compressed development strategy might include the degree that product development was predictable and followed a certain process and efficiency to hurry the process.
Experiential strategy suggests that moving faster by accelerating a well-defined process for development is unrealistic, even though speed to market is a key factor for successful innovations (Danneels 2000; Griffin and Page 1993; Gupta, Raj, and Wilemon 1986; Gupta and Wilemon 1990; Lynn and Akgun 2003; Lynn, Skov, and Abel 1999; Montoya-Weiss and Calantone 1994; Samli 2007; Sanchez 1999). The key to speeding up product development is including intuition, improvisation, and flexible options so that marketers can adapt to dynamic market environments (Agnihotri and Hu 2009; Cooper 1979; Danneels 2002; Kyriakopoulos 2011; Moorman and Miner 1998; Taggart 1995; Taghian and Shaw 2009; Vera and Crossan 2005).

Experiential strategy is observed through the firm’s frequent iteration of the innovation (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995; Sherwin 2004). Frequent iterations of the innovation increase development team understanding and, therefore, supply innovators with the intuitive feel, the experiential understanding, and the increased sensitivity to the benefits of various designs (Payne, Bettman, and Johnson 1988; Sherwin 2004; Short and Payne 2008). For example, items that measure experiential development might include the degree to which product development was unpredictable, whether development followed an uncertain process, and whether the innovation went through multiple iterations.

Justification for Proposed Research

The research proposes to fill several gaps in the existing innovation literature. These gaps include the following: 1) marrying TCI with Eisenhardt and Tabrizi’s (1995) development strategy, 2) using TCI in a tangible products context, 3) using Eisenhard and Tabrizi’s (1995) development theory in a tangible products context, 4) determining how closely aligned team
behavior is with company protocols and processes, 5) determining how capable teams can innovate in uncertainty, and 6) identifying if teams are clear about company goals and objectives for innovation.

A model to help companies identify their internal development strategy when employed with their development teams would have the following affects:

1) Increase financial returns
2) Lower the costs of innovation
3) Increase the speed of innovating
4) Aid companies in training new employees to produce new innovations, which may lead to company mission and policy recommendations

*Proposed research focus.* An extensive body of literature reveals the underlying dimensions of teams working on innovations. This literature exists because scholars want to understand teams to help the teams work on innovations more effectively. These dimensions include trust, motivation, enthusiasm, commitment, influence, improvisation, vision, participatory safety, and support for innovation (Agrell and Gustafson 1994; Anderson and West 1998b; Bain, Mann, and Pirola-Merlo 2001a; Callahan and Moretton 2001; Cespedes and Piercy 1996; Costa and Anderson 2011; Costa, Roe, and Taillieu 2001; Eisenhardt and Tabrizi 1995; Harrison 2002; Houldsworth and Alexander 2005; Khurana and Rosenthal 1998; Kivimaki and Elovainio 1999; Moorman and Miner 1998; Sandberg 2007).

The two dichotomous dimensions of development strategies supported by Eisenhardt and Tabrizi (1995) remain untested with regard to team dimensions. These development strategies do reveal the degree to which steps involved in developing innovations are uncertain and married to process. The purpose of this research will determine the team characteristics associated with
these two dichotomous development strategies (compressed versus experiential). Figure 2 represents a model that integrates the four dimensions of TTCI with the two dimensions of development strategy from Eisenhardt and Tabrizi (1995).

I propose that the team characteristics under the TTCI indicate the two dichotomous development strategies, compressed and experiential, as outcome variables.

**Purpose and scope.** Development strategies of the firm need further study. The present study aims to accomplish the following:

1. Examine team characteristics by measuring the perceptions of team members working to create new innovations in the Consumer Packaged Goods industry. Previous studies examined characteristics in technology or heavy manufacturing industries and were limited to one, two, or three dimensions of team characteristics.

2. Operationalize the Team Climate Inventory (TCI). The hypothesized model illustrates that certain team characteristics are antecedents to the two dimensions of development strategies the firm may employ. Previous studies to examine these development strategies were limited by indicating the degree the product was a new innovation.

3. Test the theoretical model that aligns one or more dimensions of team characteristics with one of the development strategies. For example, the degree to which the team is task oriented indicates whether the team is working in an experiential development environment. By providing support for the model, the model may become a tool to audit teams, employees, and strategy in the organization.
A survey to obtain a sufficient number of perceptions from individuals who work in teams to innovate Consumer Packaged Goods ideas will validate the measures, confirm the constructs, and determine the strength of association between the team dimensions and the dichotomous development strategies.

The proposed study will deepen scholars’ understanding of team characteristics, and this understanding can help audit management’s intent to develop innovations. Employing a survey method allows the collection of data quickly within the Consumer Packaged Goods industry.

Research Design

The study is designed to evaluate using the Theory of Team Climate in Innovation (TTCI) and its four-factor design in the context of Consumer Packaged Goods industry to determine what team characteristics align with the development strategies of the firm. Each participant will complete a survey containing the measures for TCI and the measures for identifying the development strategies, e.g., compressed or experiential.

The method of collecting the data is made possible through a third-party research firm that has a proprietary list of employees within the Consumer Packaged Goods industry. Particularly important is that these employees work to innovate new products for their respective employers. This study will additionally gather employment characteristics such as length of employment, employer’s industry classification (e.g., beverage or food), and size of their firm. The International Review Board provided consent on May 30, 2012 for this data-collection method, see Figure 3.

Research Questions and Conceptual Model
The proposed research can be explicated through one general research question:

To what extent do team characteristics in the climate of innovation shape the development strategies of the firm?

The research is primarily focused on understanding how teams in the climate of innovation and their underlying characteristics correlate to the type of development strategy the firm uses. It further focuses on the differences between the compressed and experiential development strategies and explains those differences by using TCI. The research question serves as the basis for developing the hypotheses explained in Chapter 3.

Summary

Important gaps in the literature remain despite an extensive body of research on innovation. The gaps are especially apparent in understanding how teams shape the development strategy of the firm where the shared vision, safety, task orientation, and support to innovate are desirable factors to achieve company development goals. These factors can be more accurately assessed by studying these constructs with a survey design among employees working in the Consumer Packaged Goods industries. This study will provide a rigorous test of prevailing theories and assumptions, will expand the scope of the phenomena of interest, and will deepen the understanding of the TTCI and of Eisenhardt and Tabrizi’s (1995) development strategy theory.

Chapter 2 provides a more detailed review of the extant literature. The theoretical constructs and model that form the basis of this study are outlined and explained. Chapter 3 develops the research hypotheses, explains the operationalization of constructs, and explicated the research design.
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CHAPTER 2

REVIEW OF RELEVANT THEORY AND EMPIRICAL RESEARCH

Overview

Chapter 1 presented the rationale for the present study. Also in chapter 1, Figure 2 presented one model (TTCI) of depicting the relationships of innovation team characteristics to development strategies. The literature supports that these relationships exist; yet they remain untested.

Chapter 2 reviews the literature that supports the proposed model. First, the literature that addresses innovation is presented. This first portion of the chapter includes the major research streams on the role of teams in innovation. Second, a review of the Theory of Team Climate in Innovation (TTCI) is provided to explain its usefulness in understanding innovation-oriented teams. Third, two development strategies are reviewed as bases of product innovation and for consideration in model development. In this review of the literature, Chapter 2 presents arguments to test relationships among these variables as a result of the gaps in marketing knowledge uncovered.

Defining Innovation

Defining innovation in itself is an interesting topic. A variety of perspectives exist in many disciplines from which to define innovation. For the purpose of this review, the most appropriate definition of innovation is “an intentional introduction of ideas, processes, products, or procedures designed to benefit a performance role, a group, an organization, or wider society” (West and Farr 1990). This definition of innovation includes the capabilities to provide new
products and services that satisfy customer demands as part of the wider-society benefit offered by West and Farr (1990).

Definitions of “new” also vary where innovations are discussed in the literature. Having a lack of a standard definition in the literature for researchers causes confusion among readers and leads to differing and incomparable conclusions both for industry and academia (Avlonitis, Papastathopoulou, and Gounaris 2001). The literature provides a spectrum of definitions for “new.” On the one end, some argue that “new” is defined as (or connotes) “meaningful uniqueness” or “radical innovation” (Bowman and Gatignon 1995; Chaney, Devinney, and Winer 1991; Hunt 2007; Im and Workman Jr 2004; Min, Kalwani, and Robinson 2006; Sethi, Smith, and Park 2001; Shocker and Srinivasan 1979; Srivastava, Shervani, and Fahey 1999; Swaddling and Zobel 1996; Verganti 2008; Wasson 1960; Zirger and Maidique 1990). On the other end, scholars define “new” as only a slight improvement to an innovation, a new attribute, and a newer version, such as a 2.0 of an existing idea (Bruner, Hensel, and James 2005; Dyson 1991; Mcewen 2007; Riggs and Thomson 2007; Zirger and Maidique 1990).

To meet the sociocultural trends of the market, marketers commonly churn out incremental, hopefully meaningful, changes to designs or attributes in tangible and intangible innovations (Reidenbach and Oliva 1981; Sherwin 2004; Stingari 1982; Verganti 2008). Incremental innovations are common, since American society lives and works in a primarily service-dominant economy that has a constant demand for new experiences (Danneels 2002a; Lusch 2007; Lusch and Vargo 2006; Madhavaram and Hunt 2008; Swaddling and Zobel 1996; Varadarajan 2010; Vargo and Lusch 2004). For example, a product such as the iPad uses a product migration approach to innovation, adding a camera to the iPad2, because “new” infers
that the customer is having a “new experience” with the device (Hoffman, Kopalle, and Novak
2010; Min, Kalwani, and Robinson 2006; Verganti 2008).

For the purpose of discussion in this proposed research, the term “new,” as used herein,
includes all the spectrum of definitions that the literature evokes, from dramatically different,
ever-before-seen innovation to the incremental attribute changes of an existing product or
service. The use of “new” for this research parallels reality and the extant literature. The role of
teams in innovation is now reviewed in the literature.

Relating Marketing Teams to Innovation

As Hunt (2002, 2010, and 1971) posits, marketing theory considers employees as human
resources (Hunt 2002; Hunt 2010; Hunt 1971). Understanding how to better employ human
resources in a team context is the primary basis for developing the proposed model for study.
Investigating teams is important for model consideration, since grouping employees into teams
to innovate has become common practice and an essential feature of organizations (Van
Offenbeek and Koopman, 1996). Teams produce an innovative culture in an organization
(Drach-Zahavy and Somech 2001; Leavy 2005). An innovative culture is known to contain
market-competent activities that drive strategic direction stimulating and sustaining innovation
success (Siguaw, Simpson, and Enz 2006).
A better understanding of successful applications of an organization’s strategy is made possible by exploring teams in an environment of innovation. Marketing teams are often charged with innovating to produce superior financial performance for their organization (Hult 2011). Superior financial performance is known to be measured by profits, earnings per share, return on investment, and capital appreciation (Hunt 2010). “Superior” means comparing an entity’s performance as either more than or better than itself or competitors (Hunt 2010). “Financial performance” simply intends that some referential point is used, such as the firm’s own financial reference points, an industry average, or a stock driven evaluation (Hunt 2010).

At this point, a research question emerges:

*What team characteristics relate to innovation in marketing literature?*

The marketing literature extensively explains a marketing team’s influence on the success or failure of innovations. Veryzer (2005) observes that 70-75% of the time companies rely upon cross-functional teams to produce superior innovations (Veryzer 2005). Cross-functional membership means that individuals are included in the project team so as to represent roles in the organization affected by and responsible for the innovation’s success (Turkulainen and Ketokivi 2011; Veryzer 2005).

For teams to achieve competency for innovation, they must have the capacity to improvise (Moorman and Miner 1998; Vera and Crossan 2005). Improvisation entails the team’s capacity to effect changes in real time. An example of improvisation at work in a team is illustrated by observing a group of musicians. Musicians are able to immediately alter a musical performance. An unplanned musical performance can be just as successful, if not a unique experience for the audience, as the playing of the exact notes in an original score. Musicians are just one example to understanding how *improvisation* can achieve a crowd-pleasing performance.
in society (Crossan 1998; Hatch 1998). Improvisation in innovation teams is believed to
contribute to innovativeness activities, and should thereby relate to a team’s effectiveness
(Hamel and Prahalad 1989; Slotegraaf and Dickson 2004).

Team stability is afforded an important role in innovation success (Slotegraaf and
Atuahene-Gima 2011). Project team stability refers to maintaining cross-functional team
membership for the duration of the innovation project (Slotegraaf and Atuahene-Gima 2011).
Though team stability is important for teams in innovation, too much stability may lead to
problems. Esser (1998) suggests that highly stable teams may fail to find alternative courses of
action, fail to improvise, and, therefore, fail to innovate (Esser 1998).

So far, this review demonstrates that researchers, especially marketing researchers, are
isolating their efforts from one another, discretely investigating single aspects of innovation
teams. Marketing scholars lack a multi-dimensional view of innovation teams. In a
comprehensive review of team characteristics by management scholars, Moorman and Miner
(1998) find that improvisation is not the only characteristic that influences team innovation
effectiveness (Moorman and Miner 1998). Their review reveals that other dimensions contribute
to innovation team effectiveness, including characteristics such as team functioning, team
commitment, and team learning. Each of these dimensions will be discussed as they are relevant
to understanding effective innovation teams and are useful for model support.

Team functioning, for example, is a factor that explains how hard team members work
together, have a sense of belonging, and focus on the team as one functional unit (Perkins et al.
2011). The extent that teams function well is known to be highly related to how much cross-
training the members have received (Slomp and Molleman 2002). Cross-training the members of
a team is generally aimed at increasing the team’s flexibility and providing a more holistic view
of the effort to develop innovations (Slomp and Molleman 2002; Song and Swink 2009). The success of cross-training has its limits. When individuals are cross-trained for different jobs in the team, results indicate that job/role identity and functioning can actually diminish, which reduce an innovation team’s effectiveness (Fazakerley 1976).

According to marketing literature, team commitment is necessary to successfully implement strategy (Cespedes and Piercy 1996). Organizational theorists in management centrally know about measuring commitment at an organizational level, and this organizational level of commitment from marketing scholars came into focus by the work of Hunt, Chonko & Wood (1985). The investigation by Hunt et al. (1985) limits its insights to commitment at an organizational level and is, therefore, a macro view of the firm’s ability to sustain performance success through commitment (Hunt, Chonko, and Wood 1985). Marketing scholars still lack in understanding commitment at a team level.

An understanding of team-level commitment in innovation was needed and fulfilled by the work of Hyatt and Ruddy (1997). Management scholars Hyatt & Ruddy (1997) find through their psychological evaluation of teams that team commitment is identified by a perceived “unification” by team members to achieve company performance goals (Hyatt and Ruddy 1997). This unification of team members is made possible by clearly communicating goals with and in groups and through providing a supportive management environment for innovation (Hyatt and Ruddy 1997).

Team learning is another dimension presented in the Moorman and Miner (1998) review. The most recent application of team learning in marketing literature is in Dayan & Benedetto (2010). Team learning is knowledge that a team gains as they produce an innovation (Dayan and Di Benedetto 2010). In their investigation, Dayan and Benedetto (2010) indicate that trust
contributes to team learning and that trust is a critical aspect of cross-functional teams (Dayan and Di Benedetto 2010). With a lack of trust, team members tend to withhold information, and when information is withheld, teams fail to learn (Dayan and Di Benedetto 2010; Roberts, Gilmore, and Wood 1997). This lack of sharing information hinders the team’s ability to innovate, thereby reducing organizational success (Madhavan and Grover 1998).

Since trust in innovation teams is a dimension of team learning, a review of knowledge about trust is warranted. Trust is a factor extensively discussed in the literature. The trustworthiness of peers is measurable by two dimensions: cognitive-based trust and affect-based trust (Dayan and Di Benedetto 2010). Cognitive-based trust is more calculated about trusting others, typically based on rational characteristics (Lewis and Weigert 1985). Affect-based trust is more emotional, contains elements of more care or concern, and is more inclined to demonstrate a social relationship in a team (Kanawattanachai and Yoo 2002).

As recent as 2011, Costa and Anderson provide the means to measure team trust in innovation. To deconstruct trust, Costa and Anderson (2011) divide trust into two components: an individual component, where the individual reveals their propensity to trust, and a relational component, which is the perceived trustworthiness of the trustee(s) (Costa and Anderson 2011). Therefore, researchers have reasonably well developed constructs to use for trust in an innovative team environment. (Dayan and Di Benedetto 2010).

Still the problem remains that marketing researchers are not evaluating teams, and specifically, researchers do not use a multi-dimensional approach to investigate teams that innovate. As indicated by this review, management researchers have investigated teams and the dynamics that determine group cohesion, group performance, and overall effectiveness. While marketing researchers make efforts to understand the impact of teams and superior market
performance, they produce only unrelated, single dimension efforts on understanding innovation teams. Consequent to the logic presented, an argument is made here that marketing researchers can use the Theory of Team Climate in Innovation (TTCI) and its associated measures (Anderson and West 1998) to approximate a team’s climate in innovation, thereby adding to marketing knowledge.

Theory of Team Climate in Innovation

The Theory of Team Climate in Innovation (TTCI) and its measures may help explain a team’s effectiveness within the climate of innovation. The climate of innovation is a different business performance climate than that of research or safety (Anderson and West 1998; Bain, Mann, and Pirola-Merlo 2001). Researchers can use a multidimensional set of measures, the Team Climate Inventory (TCI), to capture team climate within an innovating organization (Anderson and West 1998). Again, the climate of innovation differs from other climates studied in organizational and other group contexts (Anderson and West 1998; Bain, Mann, and Pirola-Merlo 2001; Cooper, Edgett, and Kleinschmidt 2004; Cooper and Kleinschmidt 1995a; Elkins and Keller 2004; Glick 1985; Okhuysen and Eisenhardt 2002; Rentsch 1990; Rousseau 1979; Schneider 1985; Weiss, Hoegl, and Gibbert 2011).

Despite over 30 years of research directed at understanding how innovation occurs in organizations and management, sociologists and organizational psychologists did not produce a consistent measure of team climate in innovation (Anderson and West 1998). Anderson and West (1998) addressed this shortcoming in the literature. The Team Climate Inventory (TCI), the instrument developed to assess team climate, reviewed next, is useful to measure team characteristics in environments in organizations that innovate.
Originally, TCI posits four factors specified by West (1990). The four factors of the TCI were tested in a comprehensive, multi-dimension, multi-trait, empirical research study by Anderson and West in 1998. Following a robust series of investigations involving factor-based evaluations, the TCI was reduced from 116 original items to its most recent version that incorporates 38 items (Ragazzoni et al. 2002).

A review of the development of the TCI instrument sheds light on its validity. Anderson and West (1998) conducted two empirical studies in service industries involving the use of TCI and reported the dimensions that explain team perceptions in the climate of innovation (Anderson and West 1998). A commercial version of the TCI was released in the UK in 1994.

To a great extent, scholars tend to employ a 38-item version of the TCI. The 38-item version of TCI has produced both four- and five-factor structures (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998; Bain, Mann, and Pirola-Merlo 2001; Bstieler and Hemmert 2010; Troy, Szymanski, and Varadarajan 2001; Weiss, Hoegl, and Gibbert 2011). Reliably in sixteen published research studies, TCI produces four dimensions of the Theory of Team Climate in Innovation. The four factors TCI measures include (1) vision, (2) participative safety, (3) task orientation, and (4) support for innovation. Figure 1, adapted from Anderson and West (1998), illustrates the four-factor structure used in model development. A discussion of each factor is presented.

Vision. The first of the four factors in the model for TTCI is vision. The terms for team vision derived by West and Anderson (1999) relate to soliciting information about team members’ views on the clarity, shrewdness, attainability, and value of team objectives (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998; Burningham and West
Vision indicates the extent to which participants feel other team members were in agreement with, and committed to, team objectives (Laverie, Madhavaram, and Mcdonald 2008; Revilla and Rodríguez 2011). When team objectives are clearly communicated downward and through the organization, this communication can build a culture of shared goals. Anderson and West (1998) make the point that this “shared-ness,” or team vision, will most likely evolve where individuals have the opportunity to interact and co-construct knowledge in their teams.

Yang and Mossholder (2004) argue that social interactions among team members allow them to establish a shared understanding of the team objectives, which provides a means to reduce or avoid task conflicts (Yang and Mossholder 2004). Garemo et al. (2008) tested this thesis by conducting research to isolate the effect that conflict has on shared team objectives. They found that team conflict is a known mediator of the relationship between a team achieving task objectives and a team’s shared vision (Gamero, González-Romá, and Peiró 2008).

Having a shared vision is known to shape innovation strategy (Cravens, Piercy, and Prentice 2000) but is not measured on development strategies in the literature. A core group vision can be rejected in informal organizations and replaced with what individual members perceive is necessary to work in their own logical sequences to meet schedules (Harrisson and Laberge 2002). The rejection of group vision can create disorder as group members lose sight of the original concept (Harrisson and Laberge 2002). While these mixed results at the team level exist in the literature, vision remains a key success factor linked with sound innovation strategy (Moenaert et al. 2010). These mixed results can also indicate further research is necessary to evaluate informal versus formal development approaches.

Participative safety. The second factor of the TTCI is participative safety. This construct entails or comprises two components: team participation and the safety of sharing ideas within
the team. Team participation includes team members’ perceptions of their influence over decision making, information sharing, and interaction frequency. West (1990) proposed that people who more fully participate in a team are also likely to invest in the outcomes of team-driven decisions (Alexiev et al. 2010; Anderson and Narus 1990; Cooper 1996; Di Benedetto 1999; Eisenhardt 1989; Eisenhardt 1990; Huang, Lin, and Su 2005; Morgan and Hunt 1994; Slotegraaf and Atuahene-Gima 2011; Weiss and Hughes 2005).

Participative safety can be divided into two constructs: safe interaction and frequency of interaction. The construct of participative safety measures the active involvement of members in a team where the atmosphere is non-threatening, is supportive, can inspire trust, and hence is safe (Costa and Anderson 2011; Elkins and Keller 2004; Hunt, Chonko, and Wood 1985; Lepine et al. 2008; Madhavan and Grover 1998; Sandberg 2007; Smith, Peterson, and Misumi 1994; Smith and Blanck 2002).

Anderson and West (1998) indicate that participative safety includes measuring to what extent team members feel comfortable proposing new ideas and examining problems together. Feeling safe to offer solutions in a non-judgmental climate is an indication of trust in the team (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998; Burningham and West 1995). Individuals who indicated they trust their team have a high propensity to trust others in general. These individuals also strongly perceive team members as trustworthy and are likely to engage in cooperative behaviors, such as participating to share ideas (Costa and Anderson 2011; Costa, Roe, and Taillieu 2001).

In temporary groups such as innovation teams, team members are often presupposed to trust one another (Meyerson, Weick, and Kramer 1996). This presupposed, almost-instant trust is referred to by Meyerson, Weick, and Kramer (1996) as swift trust. Using a theatre example, a
temporary team comes together, exhibits vulnerability almost immediately so that team performance provides an enjoyable outcome for the audience. This swift trust of team members enables the team to work effectively by coming together immediately to achieve innovation goals. Having a sense of immediacy in action or communication in innovation is associated with the best practices of highly effective new product producers (Barczak, Griffin, and Kahn 2009).

*Task orientation.* The third factor of the TTCI model is task orientation. Within a team working in the climate of innovation, the task orientation factor emphasizes a team’s degree of accountability for evaluating and modifying performance. The terms for accountability taken from West and Anderson (1998) include the utilization of intra-team advice that fosters feedback and cooperation, mutual monitoring, appraisal of performance, and exploration of opposing opinions with constructive disputes (Johnson, Johnson, and Tjosvold 2000; Tjosvold 1982; Tjosvold, Wedley, and Field 1986).

*Support for innovation.* The fourth factor of the TTCI model is support for innovation. Innovation, in its broadest sense, relates to how teams improve practices to produce new products or services considered highly novel or creative to an industry or to the world (Bain, Mann, and Pirola-Merlo 2001; Weiss, Hoegl, and Gibbert 2011). Support for innovation, which TCI measures, is a known consistent predictor and the principal predictor of innovation project success (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998; Bain, Mann, and Pirola-Merlo 2001; Burningham and West 1995). Support for innovation is most likely to occur in organizations that have integrative structures, multiple structural linkages, and emphasize collaboration in team work (Kantar 1988; Pitta, Wood, and Francak 2008; Song and Montoya-Weiss 1998; Weiss and Hughes 2005; Weiss, Hoegl, and Gibbert 2011). If innovation
is of focal importance to the organization, then identifying the team’s perceptions of support for innovation is appropriate for model development.

West and Anderson (1998), and even more overtly West (1990), argued that the support for innovation varies across teams. Team innovation requires a team’s sanctioned support, as opposed to merely individual member’s verbal support. To develop innovations, the team must recognize the need for and use resources. Leveraging the use of resources contributes to a sustainable advantage to the organization (Hunt and Morgan 1995). Daft (1986) found that resources need to be made available and accessible for innovation teams to be successful (Daft 1986). Distinctive and superior ways exist to allocate resources in innovative organizational environments (Thomas, Fowler, and Kolbe 2011). Support for innovation is articulated and enacted when the team successfully introduces new and improved products, services, or processes (Bain, Mann, and Pirola-Merlo 2001). Support for innovation is therefore essential for investigating teams in an innovative environment.

The extant literature indicates that management scholars have a tool to assess team characteristics marketing scholars have not used and that this tool is the TTCI with the TCI instrument. Marketers are often charged with innovation efforts, which make the absence of this tool’s use in marketing literature especially noteworthy. Marketing scholars and companies need an understanding of innovation teams relative to their innovation strategies so that superior company performance goals can be reached.

Table 1 lists the constructs from the TTCI. This table also includes information on the references presented in the literature that further support the use of these constructs for researching innovation teams.
Given the lack of use of the TCI in marketing innovation literature, this dissertation aims to answer this research question:

*To what extent does team climate shape business innovation strategies?*

To help address this question, a review of development strategies literature is necessary.

**Role of Strategy in Fostering Innovation**

Until the 1990s, few heated arguments took place in business literature with regard to strategy, what it is, and how it evolves in an organization. A series of agreements and disagreements takes place in the literature of the 1990s among well-known scholars and practitioners intending to define “What is Strategy?” (Coyne 1997; Hamel 1996; Ketelhohn 1997; Levien 1997; Macmillan and Mcgrath 1997; Porter 1996; Porter 1997; Stalk 1997). These scholars’ arguments indicate that a possible fundamental shift in understanding business strategy is taking place in the literature (Kuhn 1996). Eisenhardt confirms this assumption by claiming that “business strategy is changing” (Bingham, Eisenhardt, and Furr 2011; Eisenhardt 2001) and by presenting evidence to support this assertion.

Such a shift in business strategy is evidenced in the work of Eisenhardt and Tabrizi (1995) in their creation of two new theories to explain innovation strategies a firm may use to produce superior financial performance. Eisenhardt and Tabrizi (1995) discovered that an organization’s innovation efforts fall into one of two dimensions: compressed or experiential strategy.

Their paper in the mid-1990s contrasted the two theoretical models, a compressed model and an experiential model of strategy, to examine and explain a firm’s ability to achieve “fast adaptation” through innovation (Eisenhardt and Tabrizi 1995). The compressed model explains
that an organization is *compressing* or *shortening* the planned, rationalized process steps for innovation (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995). The experiential model fundamentally sheds light on the *experiential* or *intuitive* approach for innovation (Allingham 2009; Eisenhardt and Tabrizi 1995; Kyriakopoulos 2011; Prahalad and Ramaswamy 2003; Russell 2007). Each of these innovation models is presented for this chapter.

**Compressed strategy.** In today’s marketplace, the speed of innovation is a critical element for firms to produce superior financial performance (Bowman and Gatignon 1995; Cohen, Eliashberg, and Ho 1996; Cooper and Kambil 1994; Cooper and Kleinschmidt 1995b; Eisenhardt 1989; Eisenhardt 1990; Fang 2008; Lynn, Skov, and Abel 1999; Menon and Lukas 2004; Miner, Bassof, and Moorman 2001; Montoya-Weiss and Calantone 1994; Moorman and Miner 1998; Stockstrom and Herstatt 2008; Ward et al. 1995). With speed of innovation and time to market being of such importance by organizations, scholars set out to explain how companies use orthodox structures and processes to meet the demands of the speed to innovate.

Compressed strategy suggests that new innovations follow along a predictable path with certain process steps to follow; however, shortening the time for these steps intends to accelerate development (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995). To utilize a compressed innovation strategy, an organization must examine the required development steps with a focus on improving these steps so that development time is more efficient (Bstieler and Hemmert 2010; Cordero 1991).

Eliminating unnecessary steps typically reduces failure rates and contributes to firm success (Cordero 1991; Hill and Hlavacek 1972; Levinthal and March 1981; Moorman and Miner 1998; Pleshko 2007; Porter 1996; Varadarajan and Jayachandran 1999). Without considering the steps in development, innovators are likely to make mistakes, waste resources,
and have substantial delays when producing a new product idea (Eisenhardt and Tabrizi 1995). The underlying assumption of compressed strategy is that product innovation is a series of planned, predictable, but shortened steps in the organization (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995).

**Experiential strategy.** Dichotomous to the previous discussion, experiential strategy suggests that moving faster by accelerating a well-defined process is unrealistic for innovation, even though speed to market is a key success factor for many industries (Danneels 2002b; Danneels 2000; Griffin and Page 1993; Gupta, Raj, and Wilemon 1986; Gupta and Wilemon 1990; Lynn and Akgun 2003; Lynn, Skov, and Abel 1999; Montoya-Weiss and Calantone 1994; Samli 2007; Sanchez 1999; Van Oorschot et al. 2010). The key to speeding up product development is including intuition and flexible options so that innovation teams can sense and learn to meet the needs of dynamic market environments (Agnihotri and Hu 2009; Bowersox, Stank, and Daugherty 1999; Cohen and Andrade 2004; Cooper 1979; Danneels 2002a; Eisenhardt 1999; Eisenhardt and Tabrizi 1995; Ettlie and Reza 1992; Pasche and Magnusson 2011; Sethi and Iqbal 2008; Stockstrom and Herstatt 2008; Taggart 1995; Taghian and Shaw 2009; Verganti 1999; Zhou and Wu 2010).

Experiential strategy is observable through the firm’s frequent iteration of an innovation (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995). Frequent iterations also contribute to the organization’s employee development by supplying innovation teams with an intuitive feel, an experiential understanding, and an increased sensitivity for various designs to benefit (Payne, Bettman, and Johnson 1988; Short and Payne 2008). The experiential model states that the ability of employees to improvise leads to success (Stockstrom and Herstatt 2008). Eisenhardt and Tabrizi’s experiential model sheds light on the doubts in project management
literature regarding the importance of orthodox formal strategy plans (Bart 1993; Dvir and Lechler 2004; Dvir, Raz, and Shenhar 2003; Mintzberg 1994). It appears by this review that the need for formal planning is doubted, because organizations want to deliver an almost constant stream of innovations to their customers.

Table 2 lists the features of the compressed or experiential strategies adapted from Eisenhardt and Tabrizi (1995). These features are of interest for model development and for identifying important, untested relationships in marketing literature. Since these two dichotomous development strategies emerged, marketing scholars have not examined innovation teams relative to the experiential and compressed strategy models in a cohesive, multidimensional manner. This lack of research leaves the possibility to use the Theory of Team Climate in Innovation (TTCI) with its published measures, the TCI, to approximate innovation teams with experiential and compressed strategies.

Marketing organizations search for novel strategies in the innovation process, and TCI helps explain how innovation team members perceive the encouragement for members to think creatively and to develop new approaches (Anderson and West 1998; Bain, Mann, and Pirola-Merlo 2001; Bstieler and Hemmert 2010; Burningham and West 1995; Gamero, González-Romá, and Peiró 2008; Lepine et al. 2008; Troy, Szymanski, and Varadarajan 2001; Weiss, Hoegl, and Gibbert 2011). The literature review indicates a lack of knowledge by marketing scholars to understand compressed and experiential strategies, and the review indicates no use of TCI to measure innovation teams with regard to these two development strategy dimensions produced by the empirical work of Eisenhardt and Tabrizi (1995).
Summary

Chapter 2 reviewed the extant literature on the under-studied dimensions of innovation teams with regard to development strategies the firm can employ. Constructs and their features were examined to reveal the testable relationships the literature illustrates.

Chapter 3 outlines the proposed hypotheses and research design. The proposed research study is designed to examine the usefulness of the TTCI with the accompanying measures in the TCI to examine innovation teams. In particular, a structural model is proposed as a way to analyze the dimensions of innovation teams to development strategies.
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CHAPTER 3

PROPOSED RESEARCH METHOD

Overview

Chapter 1 demonstrated the rationale for the present study. This rationale included the constructs and relationships associated with teams in innovation and development strategies. Also in Chapter 1, one model of innovation, the TTCI, proposed innovation team characteristics have a relationship to development strategies. The literature supports that these relationships exist, yet they remain untested.

Chapter 2 provided support of the proposed model through a thorough literature review. First, the literature that addressed innovation was presented. The chapter included major research streams on the role of teams in innovation and supported that these research streams are isolated investigations with limitations, which demonstrates that marketing scholars lack a holistic approach to investigating teams that innovate. Second, a review of the Theory of Team Climate in Innovation (TTCI) was provided to explain its usefulness in researching innovation teams. TTCI is an under-utilized theory in marketing that takes a holistic means for investigating development strategies of the organization. Third, Eisenhardt and Tabrizi’s (1995) theory on development strategy was reviewed for model consideration. Chapter 2 presented arguments to test relationships among the variables from these theories, since the review uncovered that relationships exist but remain untested.

The conceptual presentation and rational offered in Chapter 1 and the theoretical background discussed in Chapter 2 set the backdrop for research hypotheses and a research
design that can be used to evaluate the hypotheses presented in this chapter. Thus, chapter 3 is organized around the following objectives:

1. Summarize the structural relationships to be tested.
2. Develop specific research hypotheses as a basis for testing the proposed structural relationships between teams that innovate and development strategies.
3. Relate the proposed research design to evaluate the structural model.
4. Explain the operationalization of the research constructs.
5. Describe the sequence of statistical analyses to be used to test the hypotheses.
6. Discuss limitations and implications of the proposed research.

Theoretical Framework

Causal relationships are best analyzed by constructing and then testing the causal models (Bagozzi 1980a; Bagozzi 1980b). Chapter 2 contained a review that offered untested, but potentially related, constructs in the literature. The present study leverages these relationships to construct a model for scientific explanation. The causal model presented here (a) identifies the theoretical factors of the Theory of Team Climate in Innovation (TTCI) in innovation to development strategies, (b) specifies the relationships of the constructs to their respective measures, and (c) hypothesizes relationships connecting the constructs for teams that innovate to the constructs for development strategies via a structural model. This protocol provides a basis for testing the hypotheses via structural equation modeling.

The research design presented here will be used to evaluate one causal model that posits teams that innovate and their underlying factors with two development strategy constructs. The underlying factors for teams that innovate represent the theory advocated by Anderson and West.
The two development strategy constructs represent the strategy theory of development advocated by Eisenhardt and Tabrizi (1995). The constructs underlying both TTCI and development strategy theories have related features already discussed in the literature but never tested, therefore, providing specification for the model of interest in testing (Bagozzi 1984). The theoretical framework encompasses the research question presented in chapter 1. A more specific delineation of research hypotheses in this chapter will further explain the focus of the proposed study.

Research Hypotheses

The research hypotheses presented here follow the research question discussed in chapter 1. The initial research question is broken into two dimensions that align the research objectives with the outcome variables. The first set of hypotheses focus on explaining the compressed development strategy using TCI. These first three hypotheses are:

H₁: Higher perceived vision indicates compressed strategy.

H₂: Higher task orientation indicates compressed strategy.

H₃: Higher support for innovation indicates compressed strategy.

Hypotheses 1 through 3 indicate the relationship of teams that innovate with regard to their vision, task orientation and support for innovation that have testable syntactical features that align with a compressed development strategy. For causal models to be of value, the literature should indicate that the relationships being tested exist (Bagozzi 1981; Bagozzi 1982; Bagozzi and Phillips 1982; Byrne 1998; Diamantopoulos and Siguaw 2000; Hair et al. 2006). Note, however, that support for innovation has syntactical features (Bagozzi 1984) that align with both
compressed and experiential development strategies. For that reason, support for innovation is seen again in the second set of hypotheses.

The second set of hypotheses focus on experiential development strategy thereby addressing research question 2. These two hypotheses pertain to experiential development strategy:

H₄: Higher support for innovation indicates experiential strategy.

H₅: Higher perceived participative safety indicates experiential strategy.

Hypotheses 4 and 5 indicate the relationship of teams that innovate with an experiential development strategy. Participative safety is the construct with the most emotional, intuitive features aligning with the experiential development strategy. Testing the relationship of these constructs from TTCI with experiential development is also supportable in the literature (Bagozzi 1984). Plentiful evidence suggests that support for innovation is a requirement (Gumusluoğlu and Ilsev 2009) regardless of development strategy and is a consistent predictor of team innovativeness (Burningham and West 1995). No negative relationships are found in the literature between any of the constructs for teams that innovate and development strategy features. Figure 2 depicts the causal model.

Research Design

Sample. The population of interest is consumer product developers. To test hypotheses, this research study will obtain the perceptions of employees who develop new products within the consumer packaged goods (CPG) industry. Despite the limitations of selecting one particular industry for generalizability, CPG is made up of a variety of sub-classifications that include
producers, manufacturers, and distributors of most tangible consumer goods, including beverages, hygiene, personal care, food, toys, tobacco, footwear, and cleaning products (2012; McKinsey & Company 2012). The CPG industry includes a large research population from which to draw samples, which is attractive to researchers (Campbell 1957; Kerlinger and Lee 2000; Leedy and Ormrod 2001; Malhotra and Birks 2007). To illustrate the size of the industry, CPG had a reported 1.8 million jobs as of March 2011 (GMA 2012). All participants for the study will be a sample subset of this population of interest (Calder, Phillips, and Tybout 1982; Campbell 1957; Campbell 1960; Cook and Campbell 1979; Lynch Jr 1982; Phillips 1981). The target sample size is 300–400 completed responses for use in analysis.

A third-party research source, has agreed to collect data on CPG product developers who have a wide range of experience levels for participation in the proposed study. This research vendor has experience in new product testing in CPG. The interest by the research vendor is to share in the knowledge gained by examining how teams that innovate, with their underlying dimensions, influence development strategies of CPG organizations. This method of data collection was approved under International Review Board (IRB) #12-283 on May 30, 2012; see Figure 3 for the approval.

The research vendor conducts research continuously with CPG developers and consumers. CPG produces new innovations at a rate greater than other tangible goods industries (Banks 2012). The vendor has a proprietary list of employees who work in CPG and will recruit from this list. In addition to privately funded research sessions that are for the proprietary use of their clients, the research vendor also conducts ongoing research for their own use and sale.

Development of survey instrument and measures. One survey instrument will be useful to collect data from the respondents. This instrument is comprised of items containing an 11-
point Likert response format, which was developed in cooperation with Drs. Kalwani and Silk (Kalwani and Silk 1982) with the original founders of the research firm. They found that an 11-point scale improves reliability in CPG product testing from .80 on a 5-point response to .91 for the 11-point response (Kalwani and Silk 1982). This 11-point format is a requirement by the third-party collections source for this study. The research vendor’s proprietary hardware and software was created based on an 11-point Likert response specifically for use in CPG. This hardware and software will be used for data collection.

The content of the survey instrument is based on the following considerations:

1. The 38 items known to measure TTCI and its four factors (TCI) are published and typically used by scholars in academic journals.

2. Thirteen items measure Eisenhardt and Tabrizi’s (1995) two dimensions of development strategy. At this step, the total number of items in the instrument grew to 51 from the a priori sources.

3. Faculty members expanded the number of items from 51 to 71 items by leveraging the literature and considering more features of each of the six constructs in this study. Adapting additional items from the literature supporting these constructs is deemed useful for testing and can further validate the constructs (Rossiter 2002).

4. One faculty member reviewed the items to a) modify the items for use in the CPG industry, b) create anchors that apply to all items, and c) reword or rephrase items to work well with the unified anchors.

5. Four additional faculty members reviewed the 71 items. This step helped improve the wording, positioning, and contextual use of all items for CPG and the constructs a second time.
6. Two faculty members made the final consolidation and refinement. These members came to an agreement on the selection of items to measure the six constructs that would be pre-tested with industry members.

7. Eight industry members in CPG reviewed the revised instrument. This involved soliciting assistance from product developers in several of the sub-categories of CPG. These industry members further refined and validated the items as useful in a CPG. This rigorous review will result in the finalized instrument to be sent to the research vendor for use. The instrument will be visually displayed, and respondents will be asked to select their response on the 11-point Likert scale using the proprietary hardware supplied in the data collection sessions.

Data collection procedure. A data collection session is a research event that takes place typically in a hotel ballroom. The ballroom accommodates 120-150 participants who are provided with food and non-alcoholic beverages as refreshments. Participants are asked to sit at ballroom tables and are provided a keyboard. The keyboard contains the numbers zero through ten. The keyboard is linked to data collection software that is part of a proprietary hardware and software solution patented by the third-party vendor. A host or hostess reader stands in the front of the ballroom revealing the concepts to test and asking the participants questions for their responses using the keyboard. The reader answers any clarifying questions the participants may have during the session.

As a staple item in the data collected, the research vendor obtains demographic and company characteristics of participants during every session with CPG employees. For example, one characteristic of interest is the participants’ levels of work experience. The level of work experience, meaning the length of time in a particular role or length of time employed in CPG
development, can be useful when investigating internal validity for maturation issues (Campbell 1957; Judd and Kenny 1981). Judd and Kenny (1981) and Campbell (1957) found that perceptions change over time; therefore, the length of time employees work in a role developing innovations may influence their responses (Campbell 1957; Judd and Kenny 1981). All levels of work experience are recruited by the research vendor and are desirable for use in this study as well as for future publishing interests.

Operationalization of Constructs

Previously validated scales were used to measure all constructs in the survey. Some adaptations were necessary due to survey instrument constraints and data collection requirements of the third-party supplier. The operationalization linking each construct based on their respective syntactical features is explained in this section. Operationalization of constructs is also illustrated in the model shown in Figure 2. For a complete list of all items in the final instrument see Table 1, the items measuring TTCI and Table 2 for the items measuring development strategy.

Vision. The first of the four factors in the original model for TTCI is vision. The terms for team vision from West and Anderson relate to soliciting information about team members’ views on the clarity, shrewdness, attainability, and value of team objectives (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998; Burningham and West 1995). Vision indicates the extent to which participants feel other team members are in agreement with, and committed to, team objectives (Laverie, Madhavaram, and Mcdonald 2008; Revilla and Rodríguez 2011). When team objectives are clearly communicated downward and through the organization, this communication can build a culture of shared goals. Anderson and West (1998)
make the point that this shared-ness, or team vision, will most likely evolve where individuals have the opportunity to interact and co-construct in their teams.

*Participative safety.* The second factor of the TTCI is participative safety. This construct has two components, team participation and the safety of sharing ideas within the team. Team participation includes team members’ perception of their influence over decision making, information sharing, and trust. West (1990) proposed that people who more fully participate in a team are also likely to invest in the outcomes of team-driven decisions (Alexiev et al. 2010; Anderson and Narus 1990; Cooper 1996; Di Benedetto 1999; Eisenhardt 1989; Eisenhardt 1990; Huang, Lin, and Su 2005; Morgan and Hunt 1994; Slotegraaf and Atuahene-Gima 2011; Weiss and Hughes 2005)

*Task orientation.* The third factor in the TTCI model is task orientation. Within a team working in the climate of innovation, the task orientation factor emphasizes a team’s own accountability for evaluating and modifying performance. Task orientation describes a general commitment to excellence in task performance coupled with a climate that supports improving established policies, procedures, and methods to produce innovative ideas. The terms for accountability from West and Anderson (1998) include the consideration of intra-team advice that fosters feedback and cooperation, mutual monitoring, appraisal of performance and ideas, and exploration of opposing opinions and constructive disputes (Johnson, Johnson, and Tjosvold 2000; Tjosvold 1982; Tjosvold, Wedley, and Field 1986).

*Support for innovation.* The fourth factor in the TTCI model is support for innovation. West (1990) argued that support for innovation varies across teams. Team innovation requires a team has sanctioned support, as opposed to merely individual members’ verbal support. Innovation relates to how teams improve practices to produce new products and services
considered highly novel or creative to an industry or to the world (Bain, Mann, and Pirola-Merlo 2001; Weiss, Hoegl, and Gibbert 2011). Support for innovation, which TCI measures, is a known consistent predictor, and the principal predictor, of innovation project success (Burningham and West 1995).

**Compressed development strategy.** The compressed strategy explains that an organization is ‘compressing’ or ‘shortening’ the planned, rationalized process steps for innovation (Callahan and Moretton 2001). New innovations follow along a predictable path with certain process steps to follow; however, shortening the time for these steps should accelerate development (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995). To utilize the compressed strategy, an organization must examine the required development steps with a focus on improving these steps so that development time is more efficient (Bstieler and Hemmert 2010; Cordero 1991).

**Experiential development strategy.** The experiential strategy suggests that moving faster by accelerating a well-defined process is unrealistic for innovation, even though speed to market is a key success factor for many industries (Danneels 2002; Danneels 2000; Griffin and Page 1993; Gupta, Raj, and Wilemon 1986; Lynn and Akgun 2003; Lynn, Skov, and Abel 1999; Montoya-Weiss and Calantone 1994; Samli 2007; Van Oorschot et al. 2010). Frequent iterations also contribute to the organization’s employee development, by supplying innovation teams with an intuitive feel, an experiential understanding, and an increased sensitivity for various designs to benefit (Payne, Bettman, and Johnson 1988; Short and Payne 2008). The experiential model states that the ability of employees to improvise leads to success (Stockstrom and Herstatt 2008).

**Proposed Method of Statistical Analysis**
The first step to analyzing the data will be proper management and editing of the data. All data will be assessed for validity and integrity. This will include visual checks of the data and descriptive statistics as a means of identifying possible entry mistakes or invalid responses (Hair et al., 2006). Descriptive statistics will include mean, standard deviation, dispersion percentages, skewness, and kurtosis for each questionnaire item. Subgroups may be used or a split-half analysis explored for normality. Relevant subgroups may include, but are not limited to, industry classification and length of time at company.

Dimensionality of the constructs will then be assessed with the procedure recommended by Gerbing and Anderson (1988). Also the two-step analysis approach will be taken following the procedure recommended by Anderson and Gerbing (1988). An exploratory factor analysis will be performed for all construct items (Anderson and Gerbing, 1988). Items that cross-load on more than one factor will be noted and checked for possible deletion, and guidance from the literature will be considered. Construct scales will also be assessed for reliability with Cronbach’s alpha (Cronbach and Meehl, 1955) and by checking individual scale items for item-to-total correlations (Hair et al., 2006). A confirmatory factor analysis will follow to confirm the unidimensionality of the constructs (Anderson and Gerbing, 1988; Gerbing and Anderson, 1988). Figure 4 depicts the structural model.

Once the construct scales have been set and the unidimensionality determined, a correlation matrix will be generated to demonstrate patterns of relationships among the constructs. By taking measurements into account in conjunction with a structural model, this enables a comprehensive, confirmatory assessment of construct validity by the researcher (Bentler, 1978). The measurement model provides a confirmatory assessment of convergent
validity and discriminant validity (Campbell & Fiske, 1959). Validity procedures by Hair et al. (2006) and by Fornel and Larcker (1981) for structural equation modeling will be followed. After achieving acceptable convergent and discriminant validities, testing a structural model can constitute the confirmatory assessment of nomological validity (Campbell, 1960; Cronbach & Meehl, 1955). The final steps in the analysis plan will be to test the model and determine if the model acceptably fits the theory.

Discussion

The proposed research design will allow a rigorous test of the research hypotheses. The research design offers several advantages over previous research in innovation. First, the large sample provides a rigorous test of theories leveraged here for use in CPG. Second, an evaluation of structural models will add to theory involving the relationships of teams that innovate to compressed development strategy. Third, an evaluation of structural models will add to theory involving the relationships of teams that innovate to experiential development strategy. Finally, rival models supported by the literature may help explain other applications of the seven constructs in this research. Testing rival models is an essential step in structural modeling. As recommended by Bentler and Bonett (1980), rival models are alternative models not hypothesized but yet may have explanatory power (Bentler 1990).

Despite the advantages offered by the proposed research design, several limitations should be noted:

1. Instruments used to measure the six constructs have not been used in tangible products industries such as CPG. Since the items have only been used in service or intangible
industries, the use of the items may not be supported in a different context, such as the
context this study presents.

2. The size of the sample presents additional limitations. The sample size is above that
recommended for structural equation modeling (Anderson & Gerbing, 1988). While a
larger sample is helpful for making comparisons among subgroups, larger samples tend
to provide significance in modeling, which leaves little variance (Bentler and Chou 1987;
Byrne 1998; Diamantopoulos and Siguaw 2000). This large sample is the primary reason
that structural equation modeling is the analysis of choice for model testing.

3. Other limitations involve the measurement of constructs. Multicollinearity among
constructs can be a common problem (Bagozzi and Phillips 1982). Multicollinearity is
expected because the syntactical features of teams that innovate are commonly the
features of the development constructs.

Summary and Implications

The proposed research design should allow for a rigorous examination of teams that
innovate to indicate the type of development strategy of an organization. The relatively large
sample size will provide a sound test of theory, despite the aforementioned limitations. Finally, a
comparison of the structural model proposed to rival models will enhance causal analysis of
teams that innovate to development strategies. At the conclusion of the study, conclusions and
recommendations will be made concerning (a) the role of teams that innovate to shorten
development time, (b) the role of teams that innovate to experiential development that
organizations may utilize, and (c) the direction future research should take with regard to
improving theoretical understanding of companies that develop new products. Management in
companies that develop new products can potentially use this study as an audit tool to help observe if their innovation teams and development strategies align.
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CHAPTER 4
ANALYSIS AND RESULTS

Overview

This chapter begins with the specified research hypotheses and an explanation of the population sampled. The analytical protocols are outlined, followed by analysis of the measurement model with the research constructs of interest for the study. Chapter 4 reports results of data analyses conducted to test the hypothesized model. Finally, Chapter 4 concludes with an assessment of the hypothesized relationships in the model and summary of the results.

Hypotheses to test. The compressed development strategy, considered the more formal and traditional way to innovate, may be explained by team climate measures for vision, task Orientation, and support for Innovation. The hypotheses to test include:

H1: Higher perceived vision indicates a positive impact on compressed development strategy.
H2: Higher perceived task orientation indicates a positive impact on compressed development strategy.
H3: Higher perceived support for innovation indicates a positive impact on compressed development strategy.

The experiential development strategy may be explained by team climate measures for participative safety and support for innovation. Testable hypotheses include:

H4: Higher perceived support for innovation indicates a positive impact on experiential development strategy.
H5: Higher perceived participant safety indicates a positive impact on experiential development strategy.

The hypothesized model illustrates the relationships that exist in the literature but remain untested. Figure 4 illustrates these untested relationships in the literature as described in the list of hypotheses. The contribution of this study is using the Theory of Team Climate in Innovation (TTCI) to explain the development strategies of companies in the Consumer Packaged Goods (CPG) industry.

*Population sampled.* Prior research studies that used the measures for Team Climate in Innovaton and the measures for compressed and experiential development strategies focused on researching service industries. Further, Team Climate in Innovation measures were not found in the literature to explain development strategies, especially where tangible goods are produced. Therefore, the populations of interest were product development employees who work in innovation teams within CPG. A third-party research vendor that owns a proprietary list of employees within CPG agreed to recruit 250 to 300 product developers for this study. The final number of participants recruited and data collected totaled 288. Each of these participants identified themselves as employed in CPG, working in roles associated with product development, and working in teams.

Recruitment excluded non-CPG employees, non-developers, and individual developers. Participants received a stipend for their responses. Participants responded to the research questions for this study following the normal research activities the third-party research firm originally intended. Normal data collection took place with 100 to 150 participants in each session. Data for this study was collected from two sessions with CPG employees.
Chapter 4 organization. The remainder of the chapter will cover the analytical protocol. This protocol includes describing the covariates and correlation and performing data validation through data checks and covariate checks to support the use of data for covariate analysis. Constructs are validated and the procedures for the validation methods are detailed. After presenting the reliability and validation of each construct used in the study, the two-step approach for model testing recommended by Anderson and Gerbing (1988) was used to evaluate the measurement model and the structural model. The measurement and structural model test results are presented, followed by limitations and key findings.

Analytical Protocol

The research vendor delivered one data set, containing all 288 collected responses. The data was first examined by reviewing frequencies and descriptive statistics for all 49 items. Next, the six proposed constructs were examined for unidimensionality, item validity, and measurement reliability. Dimensionality and factor structure of the research constructs were evaluated using exploratory analysis and reliability assessment in SPSS. Dimensionality was assessed as suggested by Anderson and Gerbing (1988). With the exception of seven respondents, 281 participant responses along with all six constructs of interest for model evaluation were used to operationalize testing the hypotheses.

The proposed theoretical structural model was evaluated using covariance structure modeling in LISREL 8.8 (Joreskog and Sorbom 2006). The following sections relate the results of the data analysis. Tables 3-8 summarize descriptive statistics for all items, organized by associated construct. Figure 4 illustrates the relationships hypothesized for the structural model.
Description of covariates and correlations. This section explains data validation checks and the covariance-based model estimations.

Data collected by the research vendor was delivered in one Microsoft Excel spreadsheet. The spreadsheet contained a complete list of the 49 items desired for data collection; 33 items measure the dimensions of Team Climate in Innovation and 16 items measure the dimensions of development strategy (Tables 1 and 2). Participants’ items were checked thoroughly for observable anomalies. As discussed in Chapter 3, an 11-point Likert scale was used as required by the research vendor. The scale anchors of 0, 5, and 10 match the technology used by the research vendor for data collection.

There were very few visible errors and only six missing data cells out of a possible 13,769 cells (281 participants times 49 items) in the data file received from the research vendor. Descriptive statistics (mean, standard deviation, variance, skewness, kurtosis) were calculated for each item. Many items deviated from a perfectly normal distribution (Tables 3-8) but did not demonstrate extreme univariate abnormality. Skewness or kurtosis were noted for consideration in analysis.

Since the third-party research vendor controlled the calling and recruitment of the participants using their own proprietary contact list, the demographic characteristics collected were also under the control of the research vendor. These demographic characteristics were included in the data file the vendor supplied for analysis (see Tables 9-13). Seventy-six percent (76.2%) of the participants were between the ages of 25 and 54. Fifty-five percent (55.2%) indicated they were Caucasian. With regard to education, forty-seven percent (48.1%) indicated having some college and/or an associate’s degree. Fifty-one percent (51%) had a bachelor’s degree or higher. Forty-four percent (44.5%) of the participants were in management roles with
their current CPG employer. Another 12.8% were in marketing, 16% were in project management, and 11% were in production roles in their companies. Thirty-seven percent (37.4%) have worked for their current employer one to two years, while forty percent (40.2%) indicated working between three and ten years. In conclusion, the participants are educated and have work experience in CPG.

Four questions were included about the participants’ perception of their knowledge about product development. Tables 14-17 detail the result of these four profiling questions included in the instrument. Fifty-six percent (56.9%) of the participants indicated they agree or strongly agree with the statement, they are “knowledgeable about how most product development teams” function within their company. Fifty-eight percent (58.4%) of the participants considered themselves “veterans in product development” by indicating they agree or strongly agree with the statement about their veteran experience in product development teams. Fifty-four percent (54.5%) of the participants expressed confidence in answering questions about product development teams and how these teams function. Fifty-seven percent (57%) of the participants agree or strongly agree with the statement, they were “an experienced participant in product development teams” at their company. The overall conclusion is the participants for data collection were knowledgeable and experienced in both product development and working in teams within their respective CPG companies. The results support the third-party research vendor collected the data sample from the desired population of interest for the study.

Covariate checks were accomplished by several methods: 1) conducting a split-half reliability analysis, 2) checking for linearity, 3) checking for univariate normality, and 4) checking for multivariate normality. Tables 18-23 detail the results of the split-half reliability analysis following the procedure outlined by Malhotra (2007) conducted in SPSS. All split-half
forms indicated a reliability coefficient greater than .70 (Kerlinger and Lee 2000), which demonstrates internal consistency. Linear plots and range graphs were examined for linearity and outliers, which revealed that data appeared linear for all 49 items of interest in the study. Univariate checks were conducted by a review of calculations for skewness and kurtosis. The results of these tests are in Tables 3-8.

Following the recommendation of Byrne (1998), the data passed a univariate check for skewness < 3.00 and kurtosis < 21.00, and no extreme skewness or kurtosis existed (Byrne 1998). However, while the multivariate data check for normality passed centrality requirements, that is 68% of means were within one standard deviation, 95% of means were within two standard deviations (Frankfort-Nachmias and Leon-Guerrero 2011; Malhotra and Birks 2007), notable non-normality existed when Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) statistics were calculated. This non-normality was noted and considered in the validity checks for measurement and structural model testing.

*Validation of constructs.* As summarized in Chapter 3, most of the measures employed in this study were used in previous studies and have in the past exhibited acceptable validity and reliability (Agrell and Gustafson 1994; Anderson and West 1999; Anderson and West 1996; Anderson and West 1998; Callahan and Moretton 2001; Dackert, Brenner, and Johansson 2002; Eisenhardt and Tabrizi 1995; Kivimaki and Elovainio 1999; Kivimaki et al. 1997; Lepine et al. 2008; Loo 2003; Loo and Loewen 2002; Ragazzoni et al. 2002). Measures for the constructs went through a rigorous review following similar expert review procedures by Zaichowsk (1985) and Diamontopoulos (2005).

The procedure for this study’s rigorous review included four rounds of expert judges pre-testing the instrument items. The first round was with CPG product developers, the second
round with faculty members in business-related fields, followed by a third round with different 
CPG members. In the fourth round, two faculty members finalized the items and organized the 
instrument for submission to the third-party research vendor for data gathering.

As a result of this rigorous expert review, a few additional measures for constructs were 
developed, modified, or adapted specifically for this study conducted within CPG, since all a 
priori items were previously used in service industries. For example, for the construct 
compressed development strategy (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995), 
the items “spent significant time planning future actions to meet team objectives,” “followed a 
series of well-defined steps to meet team objectives,” “shortened development time by 
overlapping steps,” and “was rewarded for meeting schedule deadlines during the course of the 
project” are examples of a few items refined through the expert review process to adapt the 
construct for the CPG industry. For the construct experiential development strategy (Callahan 
and Moretton 2001; Eisenhardt and Tabrizi 1995), the items “accelerated the development 
process by simultaneously considering alternative designs/ options,” “tested various alternative 
designs/options during the development process,” “conducted frequent formal evaluation reviews 
(benchmarks) during the development process,” “was motivated to keep a certain ‘pace’ of 
development,” and “achieved more design options than teams using predictable steps” are 
examples of items refined through the expert review adapted for use in the CPG. A complete list 
of the development strategy items used in the final instrument is available in Table 2.

For the measures of team climate in innovation (Anderson and West 1996; Anderson and 
West 1998; Kivimaki et al. 1997), the items for constructs vision, task orientation, support for 
innovation, and participative safety had a few modifications to adapt the a priori scales for use in 
CPG. A complete list of the team climate in innovation items used in the final instrument by the
research vendor is available for view in Table 1. The following sections speak to the procedures and validation of constructs of interest for model testing.

**Procedure for validating constructs.** The procedures used to evaluate dimensionality and discriminant validity for constructs were suggested by Anderson and Gerbing (1988), Hair et al. (2006), and Fornell and Larker (1981). LISREL 8.8 software was used to assess measurement models (Joreskog and Sorbom 2006). The procedure used to evaluate item-based validity and reliability followed suggestions of Hair et al. (2006), Churchill (1979), and Nunnally (1978). For each of the six constructs, an exploratory factor analysis was conducted to provide an initial impression of dimensionality in SPSS. In addition, Cronbach alpha reliability (Cronbach and Meehl 1955) and item-to-total correlations were calculated for each measure. Confirmatory factor analysis was conducted in LISREL 8.8 (Joreskog and Sorbom 2006) to assess the dimensionality of the constructs. Final validation procedures followed Hair et al. (2006) for construct validity.

A conservative approach was taken for exploratory factor analysis (EFA). An EFA was conducted using 1) a principle-components extraction and 2) un-rotated solution. Component analysis is most appropriate when data reduction is a priority (Hair et al. 2006). Un-rotated solutions also achieve data reduction (Hair et al. 2006). Taking an un-rotated approach to factor analysis maximizes the variance accounted for by the first and subsequent factors (Kim and Mueller 1978b). The unique factors produced in an EFA are assumed orthogonal (Kim and Mueller 1978a). Podsakoff et al. (2003) suggests that this technique, using un-rotated solutions, will either reveal a single factor or a general factor accounting for the majority of the covariance among the measures.
An EFA revealed potential concern as the first factor accounted for 66% of the total variance. This amount of variance by one factor in an EFA indicated potential common method bias or multicollinearity, or both, in the data. The high loading on one factor was noted for further consideration. A test to explore the underlying cause of the high loading was explored.

To confirm whether a potential common method bias existed, the most widely used Harman single-factor test was performed to assess common method variance (CMV) (Malhotra, Kim, and Patil 2006). Results of the Harman single-factor test confirmed that CMV existed. CMV refers to the amount of spurious variance that is shared among items used in the data collection (Buckley, Cote, and Comstock 1990; Malhotra, Kim, and Patil 2006). Upon consideration of the causes for CMV discussed by Podsakoff et al. (2003), the data collection method for this study, where respondents responded at the same time to the same item using keyboards, was likely a measurement context contributor to the CMV problem in the data (Podsakoff et al. 2003). The context where data is collected is a known issue in considering the results of research generalizability (Mcgrath 1981). CMV can also be an underlying cause that explains multicollinearity problems in the data (Malhotra, Kim, and Patil 2006). The CMV problem was noted for further consideration in model testing, results, and implications.

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and the Bartlett Test of Sphericity were used to analyze the instrument items. The KMO compares the magnitude of observed correlation coefficients to the magnitude of partial correlation coefficients. The first review was that of the KMO index. A KMO index of .5 to .6 is considered barely tolerable, while an index of .9 is considered excellent (Kaiser 1970; Kaiser and Rice 1974). All scales in the present study had a KMO index of .8 or greater, which indicates that the sample is appropriate for factor analysis. Second, the Bartlett Test of Sphericity is used in factor analysis to determine
if the items are unrelated so that the correlation matrix produced by the items is an identity matrix (Norusis 1990). A significant test statistic for the Bartlett Test of Sphericity indicated that the data is suitable for factor analysis. A result from the Bartlett Test for Sphericity was significant for all scales in the present study.

*Item reliability.* Next, the item reliability and factor analysis results for each of the four dimensions for team climate and the two dimensions (compressed and experiential) for development strategy are presented. Table 24 summarizes the Cronbach alpha reliabilities for each of the constructs. All six constructs have a Cronbach reliability of $> .70$, which indicates an acceptable reliability (Hair et al. 2006). Composite reliability (CR) for the construct per Fornell and Larcker (1981) and Hair et al. (2006) indicated that all six constructs met acceptable levels of $> .70$ to represent internal consistency of items measuring the same latent construct. Construct validation procedures followed procedures in Hair et al. (2006). The following discussion reports reliability and validity for each construct measured in the study.

*Four factors of team climate in innovation.* The well-published scales measuring team climate in innovation consistently reveal four dimensions of team climate for innovation (Kivimaki et al. 1997). These four dimensions are vision, task orientation, participative safety, and support for innovation. Of the 33 items presented in Chapter 3 that measure team climate in innovation and its four dimensions, 18 items were retained through data reduction and confirmatory factor procedures. These 18 retained items were reviewed for support by the literature to indicate the four constructs intended by the TTCI. Each of these four dimensions is now discussed for their construct reliability and validity. An overall conclusion about reliability and construct validity is then reported.
The five items used in hypotheses testing that measure vision are reliable with a Cronbach alpha of .96, as reported in Table 24. CR for the construct following the prescribed evaluation by Fornell and Larcker (1981) and Hair et al. (2006) was acceptable at CR = .96. CR was easily computed using the squared sum of factor loading for each construct from the Lambda matrix produced in LISREL, and a sum of the error variance terms was produced in LISREL from the Theta-Delta matrix (Hair et al. 2006). Convergent validity was achieved with these five items retained for vision. Vision passed the measure for CR (Table 25), had factor loadings of .7 or higher, which met requirements in Hair et al. (2006), and had an average variance extracted (AVE) higher than .50 following the recommended minimum by Fornell and Larcker (1981). Factor loadings and AVEs are listed in Table 25.

Discriminant validity was achieved because the construct vision passed both tests by Hair et al. (2006). Ideally, high discriminant validity is indicative of the items measuring the intended construct and no other construct. Hair et al. (2006) suggests two common ways of assessing discriminant validity. A rigorous approach was taken to evaluate the constructs by performing both Hair et al. (2006) discriminant validity tests.

A series of confirmatory models in LISREL was the first test to assess discriminant validity. One series of models included all possible pairings of constructs where the inter-correlations of the factors were set to unity (Lewin and Sager 2009). The second series of models for all possible pairings of constructs had this inter-correlation restriction removed so that these constructs could vary freely. For each case in the series, a chi-square difference test was conducted that compared the restricted with the free-pairing model. Hair et al. (2006) found that discriminant validity is achieved if the one-construct model significantly differs from the two-
construct model. If the models are not significantly different, then discriminant validity is insufficient (Hair et al. 2006).

Table 26 summarizes the testing of a one-construct versus the two-construct model. The two-construct model that contains vision is significantly different from the one-construct model that demonstrates discriminant validity based on the chi-square difference test with one degree of freedom ($1df$).

The second test is considered a better test of discriminant validity. This test of discriminant validity, a comparison of the AVE for all combinations of constructs, was conducted with their squared correlation estimate, or $R^2$, on the construct vision. The $R^2$ calculation was produced using the completely standardized solution of the correlation of the exogenous with the endogenous constructs (see Table 28). When the variance-extracted estimates are greater than the squared correlation estimate, then discriminant validity is achieved (Hair et al. 2006). Vision passed all paired-comparison tests, as shown in Table 28.

The two assessments for discriminant validity of the construct vision found that the measures for vision explain vision better than other constructs.

Nomological validity was achieved by examining the correlations among the constructs. The strength and direction of vision measures made sense from a review of the correlations produced by the Phi matrix in the measurement model (see Table 31) as well as in the Eta and Ksi matrix in the structural model the LISREL analysis (see Table 24). Face validity is a subjective assessment of measurement items to ensure the selection of scale items is based on more than solely empirical issues (Churchill Jr 1979). Face validity was deemed achieved by both the a priori use of the measures for vision as well as the expert reviewers’ pilot testing of the items to measure vision.
The four items retained for use in hypotheses testing that measure task orientation are reliable with a Cronbach alpha of .91, as reported in Table 24. Convergent validity was achieved with these four items for task orientation. Task orientation passed the minimum for composite reliability (Table 25) established by Fornell and Larcker (1981), with factor loadings of .7 or higher at CR = .93. The desired AVE of higher than .50 was achieved (Hair et al. 2006).

Mixed results exist on the two discriminant validity tests for the items measuring task orientation. The first discriminant validity test indicated that items measuring task orientation do not significantly discriminate from the measures for support for innovation but did significantly discriminate with all other constructs. Table 26 summarizes testing the fit of a one-construct versus a two-construct model based on the chi-square difference test with 1 df with all possible model combinations.

Similar to vision, the second test for discriminant validity also was applied here by comparing the AVE for all combinations of constructs versus their squared correlation. Task orientation discriminated with the vision construct but not with any other constructs. Table 28 reports the AVE paired comparison. The problem with discriminant validity was noted for measurement and structural model testing.

Nomological validity was achieved by examining the correlations among the constructs. The correlation strength and direction of task orientation compared to the compressed construct made sense with theory (Hair et al. 2006), as shown in Table 24. Face validity was deemed achieved by both the a priori use of the measures for task orientation as well as the expert reviewers’ pilot testing of the items to measure task orientation.

The five items for use in hypotheses testing that measure participative safety were combined to achieve a Cronbach alpha of .97, as reported in Table 24. Convergent validity was
achieved with five items measuring participative safety. Participative safety passed the CR requirement, CR = .96 (Table 25), had factor loadings of .7 or higher, and achieved AVE of higher than .50 (Hair et al. 2006).

Results were mixed on discriminant validity tests for the items measuring participative safety. The first discriminant validity test indicated that items measuring participative safety significantly discriminated from the measures of all other constructs based on the chi-square difference test with 1 df.

The second test of discriminant validity compared the AVE for all combinations of constructs. By review of the combinations, the AVE for participative safety did not discriminate with most constructs. Participative safety did discriminate with vision. Table 28 reports the paired comparison. A notation was made regarding the problem with discriminant validity among this pairing.

Nomological validity was achieved by examining the correlations among the constructs. The correlation strength and direction of participative safety compared to the experiential construct made sense with theory (Hair et al. 2006), as shown in Table 24. Face validity was deemed achieved by both the a priori use of the measures for participative safety as well as the pilot testing of the items to measure participative safety.

The four items for use in hypotheses testing that measure support for innovation were combined to achieve a Cronbach alpha of .90, as reported in Table 24. Convergent validity was achieved with four items for support for innovation. Support for innovation passed the measure for composite reliability, CR = .85 (Table 25), established by Fornell and Larcker (1981). Factor loadings of .7 or higher and AVE higher than .50 was achieved (Fornell and Larcker 1981; Hair et al. 2006).
Results were mixed on discriminant validity tests for the items measuring support for innovation. The first test, the one-construct versus two-construct model, indicated that items measuring support for innovation did not significantly differ from the measures for task orientation and experiential development strategy based on the chi-square difference test with 1 df. Table 26 summarizes the testing of a one-construct versus a two-construct model.

The second test of discriminant validity was performed. Only one combination passed the requirement of AVE > R². Support for innovation passed discriminant test with vision and no other construct. Table 26 reports the paired comparison. The discriminant validity problem was noted.

Nomological validity was achieved by examining the correlations among the constructs. The correlation strength and direction of support for innovation compared to the compressed and experiential constructs made sense with theory (Hair et al. 2006) (see Table 24). Face validity was deemed achieved by both the a priori use of the measures for support for innovation as well as the pilot testing of the items to measure support for innovation.

Development strategies. As discussed in Chapter 2 and presented for testing in Chapter 3, two dimensions of development strategies exist within a firm. These two dimensions of development strategies were supported by Eisenhardt and Tabrizi (1995) and validated by Callahan and Morretton (2001) in service industries. These dimensions are a compressed development strategy and an experiential development strategy. The results of evaluating each of these dimensions for reliability and validity in CPG are now presented.

The four items for use in hypotheses testing that measure compressed strategy combined to achieve a Cronbach alpha of .85, as reported in Table 24. Convergent validity was achieved with these four items for compressed strategy as compressed strategy passed the measure for CR
with a CR of .80 (Table 25), accomplished factor loadings of .7 or higher (Hair et al. 2006), and achieved AVE higher than .50 (Fornell and Larcker 1981).

Results were mixed on the two discriminant validity tests performed. Using the one-construct versus the two-construct test, the measures for compressed strategy significantly discriminated with all constructs using the chi-square difference test. However, the second test used a comparison of the AVE to $R^2$ for all combinations of constructs, and the compressed strategy failed the AVE comparison test with most constructs except vision. The problem with discriminant validity was noted. Table 28 reports the paired comparison.

Nomological validity was achieved by examining the correlations among the constructs. The correlation strength and direction of the compressed construct to the vision, task orientation, and support for innovation constructs made sense with theory (Hair et al. 2006) (see Table 24). Face validity was deemed achieved by both the a priori use of the measures for compressed strategy as well as the pilot testing of the items to measure the compressed development strategy construct.

The five items retained for use in hypotheses testing that measure experiential strategy were combined to achieve a Cronbach alpha of .86, as reported in Table 24. Convergent validity was achieved with these five items for experiential strategy. Experiential strategy passed the measure for CR, $CR = .94$ (Table 25), accomplished factor loadings of .7 or higher (Hair et al. 2006), and achieved AVE higher than .50 (Fornell and Larcker 1981).

Results were also mixed on discriminant validity for the items measuring experiential strategy. On the first test, the measures for experiential strategy discriminate with all other constructs except with support for innovation based on the chi-square difference test with 1 df. For the second discriminant validity test, the AVE for experiential strategy was not greater than
the squared correlation (Fornell and Larker, 1981) of any constructs. Experiential development strategy did not pass the AVE comparison test. Table 28 reports the paired comparison. A note was made about the problem with discriminant validity.

Nomological validity was achieved by examining the correlations among the constructs. The correlation strength and direction of the experiential construct compared with participative safety and support for innovation made sense with theory (Hair et al. 2006), as shown in Table 24. Face validity was deemed achieved by both the a priori use of the measures for experiential strategy as well as the pilot testing of the items to measure the experiential development strategy construct.

**Conclusion.** The conclusion from examining the measures for reliability was that the measures were reliable for use in covariance techniques. However, while each construct passed composite reliability and minimum requirements for variance were explained, a problem with discriminant validity revealed that interpreting the results of the structural model may be problematic. This problem with discriminant validity was considered during measurement and structural model testing. All model testing was performed using LISREL 8.8 (Joreskog and Sorbom 2006). Table 25 includes all factor loadings and t-values. T-values indicate each of the items significance at p < .05 for use in analysis.

**Structural Model Testing**

**Two-step approach to model testing.** The two-step approach to model testing suggested by Anderson and Gerbing (1988) first tests the measurement model and then tests the structural model of interest. The previous section included results of the confirmatory factor analysis for the measurement model tests. The confirmatory factor analysis conducted using LISREL gave
support for the dimensionality and the convergent, nomological, and face validity of the constructs. Discriminant validity failures were noted.

The second step of the two-step approach entails testing the theoretical model using structural equation modeling. All models tested were assessed with multiple fit indices. The standard $\chi^2$ statistic is used for model comparison purposes, although this statistic almost always rejects the model due to high sample size (Gerbing and Anderson 1992). Other fit indices reported include the root-mean-square residual (RMR), the root-mean-square error of approximation (RMSEA), and the non-normed fit index (NFI; also called the Tucker-Lewis index). The NFI is a widely used incremental fit index and is helpful for model comparison (Kline 2005), while the RMR and RMSEA recommended by Brown and Cudeck (1989) are absolute fit indices. The NFI and RMSEA are especially helpful in compensating for the effect of model complexity (Hu and Bentler 1998). Critical N is also helpful for examining model comparisons (Diamantopoulos and Siguaw 2000).

_Evaluation of measurement model._ In addition to the confirmatory factor analysis steps already presented, a measurement model evaluation was conducted to show how the constructs fit with their intended measures and measurement error (Hair et al. 2006). Unidimensionality depends on each factor’s measures and error terms being independent (Anderson and Gerbing 1988). Since controversy exists in structural equation modeling (SEM) on permitting indicators to load on multiple factors (Kline 2005), permitting indicators to co-vary on multiple factors was prohibited in the analysis reported here, even though high multicollinearity was noted earlier in the confirmatory factor analysis.

Two conditions must be met for any measurement model. First, the number of free parameters must be less than or equal to the number of observations. Second, every latent
variable must have a scale. Both conditions were met following the procedures outlined by Kline (2005). The next test involves the inspection of the Phi matrix, the matrix of estimated correlations among the parameter estimates.

High correlation among the parameters was expected for theory testing. Table 31 includes the correlations among the parameter estimates. All correlations are significant at $p < .05$. Upon inspection of the Phi matrix, several high ($> .70$) correlations were noted. A few of the correlations nearest 1.0 were interpreted as potential identification problems in model specification. High correlations can indicate a problem that one parameter estimate may not be derived independent of another. The two tests of discriminant validity presented earlier confirmed a potential problem with parameter estimates. The test for the existence of a common method bias in the data confirmed a problem existed. These problems were considered during model testing.

**Evaluation of structural model.** The following section explicates testing the hypothesized model. As illustrated in Chapter 3, the endogenous variables, which measure the two dimensions (compressed and experiential) of development strategies, are hypothesized to demonstrate how TTCLI and its associated dimensions can help explain these development strategies (Figure 4).

These hypotheses were tested by using a model building approach (Hair et al, 2006). First, the fit of the hypothesized five-path model was tested. Figure 5 illustrates the hypothesized five-path model. To explain the difference between the five-path and the eight-path model, the eight-path model included all possible path relationships with the same number of constructs, whereas the five-path model included only the five hypothesized paths supported by the literature. The five-path model was therefore “nested” within the eight-path, or it was a “subset” of a hierarchical model (Mueller and Hancock 2004). Testing a path connecting
compressed with experiential constructs did not make theoretical sense, as these constructs explain completely separate and distinct development strategies that a firm may employ for development (Eisenhardt and Tabrizi, 1995).

Figure 6 illustrates the eight-path model tested. The comparison of the five-path model, also known as the target model (Tomarken and Waller 2003), to a model with all possible linkages can be of significant value in structural equation modeling (Anderson and Gerbing 1988; Tomarken and Waller 2003). The normed fit index (NFI) is a useful tool in addition to the chi-square difference test to evaluate nested model comparison (Mulaik et al. 1989). The chi-square difference test is the most widely used test to decide if models are significantly different.

The eight-path model exhibited a slightly better fit than the five-path model. The chi-square goodness-of-fit was significantly different when the chi-squared difference test was conducted. Further, the eight-path model exhibited a higher Critical N, even though neither model met Critical N minimum requirements (Diamantopoulos and Siguaw 2000). Table 29 summarizes the fit indices for both the five-path and the eight-path structural model.

The eight-path model was deemed useful to report hypotheses testing. The fitted eight-path model had a $\chi^2$ of 2966.66, an unacceptable GFI of 0.569, and an unacceptable AGFI of 0.474 that did not meet the requirement of $> .90$ to indicate a fit (Byrne 1998; Diamantopoulos and Siguaw 2000). The NFI (Bentler and Bonett 1980) and the comparative fit index (CFI) (Bentler 1990) met acceptable requirements for a fit at 0.921 and 0.928 respectively. The NFI and CFI for the eight-path model were slightly higher than for the five-path model.

The incremental fit index (IFI) was developed by Bollen (1989) to address parsimony issues with sample size and model parameters known to be a problem with NFI (Kline 2005). IFI of the eight-path model met acceptable requirements and was slightly higher than the five-path
model at 0.928. The root mean square error of approximation (RMSEA) was first proposed by Steiger and Lind (1980) and explained by Browne and Cudeck (1993) to illustrate how well the model, with its chosen parameters, would fit a population covariance if available (Kline 2005). RMSEA values of less than 0.05 indicate a good fit. Neither model resulted in an acceptable RMSEA value.

An absolute fit index, the standardized root mean square residual (SRMR), is reported as a summary statistic based upon residuals between the elements of the implied and observed covariance matrices (Kline 2005). While some scholars recommend an SRMR of <.05 (Diamantopoulos and Siguaw 2000), other scholars suggest that an SRMR of less than .08 is an acceptable fit (Hu and Bentler 1998). The eight-path model had a slightly lower SRMR than the five-path model. The eight-path model had SRMR of 0.0785.

Considerable attention was given to the poor fit of the eight- (and five-) path model indicated by a significant chi-square p-value, a high RMSEA, a high GFI, and a high AGFI. However, the indices for NFI, CFI, and IFI indicated a good fit.

*Relationships hypothesized.* Three hypothesized relationships were tested using the eight-path model for research question one, “How do the dimensions of team climate in innovation explain compressed development strategy?” The R²'s were sufficiently greater than the minimum requirements (> .30) and satisfied the strength of association and direction for the dimensions of vision, task orientation, and support for innovation, which positively associate with a compressed development strategy (see Figure 7).

Upon review of the standardized path coefficients, sufficient evidence indicates that vision (t = 4.45, p < .05), task orientation (t = 3.64, p < .05), and support for innovation (t = 2.96, p < .05) helps explain a compressed development strategy (see Table 30). Vision passed both
discrimination tests with the items measuring compressed development strategy. While task orientation and support for innovation discriminated from the measures for compressed development strategy on the first discriminant validity test performed, both of these constructs did not pass the second, more restrictive test for discrimination where the variance extracted for any two constructs is compared with the squared correlation estimate between the two constructs (Table 30).

Two paths were tested to explain the experiential construct for research question two, “How do the dimensions of team climate in innovation explain experiential development strategy?” The paths connecting participative safety and support for innovation to the experiential construct were used for hypotheses testing. Path analysis indicated insignificant results. The path coefficients were insignificant to support the two hypothesized paths (see Table 30).

While task orientation sufficiently discriminated with experiential strategy on the first test for discriminant validity, support for innovation did not (see Table 30). Neither task orientation nor support for innovation passed the second, more restrictive test for discrimination with experiential strategy where the variance extracted for any two constructs was compared with the squared correlation estimate between the two constructs.

Summary

*Key limitations of methods.* Three issues were noted as limitations in the methods for this study. First, using a homogenous group of respondents from the research vendor was noted as a limitation. The interest was high in using a priori items for the TTCI and the two development
strategy dimensions in a tangible product industry, so restricting participants to only CPG manufacturers may have created a more than usual homogeneous grouping.

Second, given the nature and speed of data collection used by the research vendor, reversing items was considered but not used in instrumentation. Reversing items may have helped avoid the high multicollinearity among the items. Reversing items has long been used to aid with participant acquiescence in their responses that may lead to unidimensionality of the measures (Fishbein 1967; Kerlinger and Lee 2000). However, reversing items is also known to cause respondent to misinterpret items, because the symmetry of their experience can be affected by reversing the wording from a positive/affirmative statement to a negative/disaffirming statement (Herche and Engelland 1996).

Third, the participant’s experience may have contributed to multicollinearity, since the data collection method had participants seated next to one another responding to each item at the same time. The contextual experience shared by the respondents is one of the known underlying causes for common method bias according to Podsakoff et al. (2003).

Key findings. Despite the less-than-ideal fit of the overall model, the standardized coefficients in the path analysis were useful in providing sufficient evidence to indicate the support of hypotheses 1, 2, and 3. The hypotheses are stated and results reported as follows:

H1: Higher perceived vision indicates a positive impact on compressed development strategy. Supported.

H2: Higher perceived task orientation indicates a positive impact on compressed development strategy. Supported.

H3: Higher perceived support for innovation indicates a positive impact on compressed development strategy. Supported.
H4: Higher perceived participant safety indicates a positive impact on experiential development strategy. *Not supported.*

H5: Higher perceived support for innovation indicates a positive impact on experiential development strategy. *Not supported.*

**Conclusion.** The structural equation model method of analysis produced evidence that the dimensions of the TTCI can help identify a compressed development strategy but not the experiential development strategy. Limitations to these findings include mixed results on discriminant validity among many of the constructs used in the study and the potential that a common method bias occurred in the data used in the analysis.

Chapter 5 presents a discussion of these results, outlines theoretical and managerial implications, specifies contributions of this research, and offers limitations and directions for future research.
References


CHAPTER 5
RESULTS AND DISCUSSION

Overview

Chapter 5 discusses the results and implications of the findings. Contributions of the study are presented, along with limitations and recommendations for future research.

Findings of Analysis of Structural Equation Models

As explained in Chapter 4, the hypotheses were tested with structural equation modeling. This approach represents a more sophisticated way to assess simultaneously predictive relationships (Hair et al. 2006). Structural equation modeling (SEM) fundamentally depends on the measurement of constructs; therefore, SEM requires strong knowledge in measurement theory (Kline 2005). Careful screening of the data through data checks revealed potential common method bias. Common method bias could help explain the high correlations among constructs (Podsakoff, Mackenzie, and Lee 2003), which causes multicollinearity to exist in the fitted structural models.

Multicollinearity was assessed by prescribed methods (Byrne 1998; Hair et al. 2006; Kline 2005). Two models were examined. First, a five-path model was the structural model containing the five-path relations that supported the hypotheses for testing. Second, an eight-path model contained all possible endogenous to exogenous linkages. Three of the eight possible path combinations were not supported by theory development; however, taking a saturated model approach to evaluate the model’s fit is an acceptable approach for hypotheses testing (Byrne 1998; Diamantopoulos and Siguaw 2000; Kline 2005). Kline (2005, p. 145) calls the
prescribed approach a hierarchical approach where a model containing less paths is a subset within the other. The five-path model is a subset of the eight-path model.

With such high multicollinearity in the latent variables most likely caused by a common method bias, the eight-path model provided the better fit for evaluation and reporting of the five hypotheses tested. The results were that the measures of team climate in innovation can explain the compressed development strategy used by a firm that produces new ideas in a team approach to product creation.

Research Questions

Two research questions emerged from a review of the literature. Untested relationships existed in the literature by using the Theory of Team Climate in Innovation (TTCI) (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998) to explain two dimensions of development strategies (Eisenhardt and Tabrizi 1995). Three hypothesized relationships that used three of the four dimensions of team climate in innovation were proposed and then tested for research question one, “How do the dimensions of team climate in innovation explain compressed development strategy?” Two hypothesized relationships that used two of the four dimensions of team climate in innovation were proposed and then tested for research question two, “How do the dimensions of team climate in innovation explain experiential development strategy?” The findings for each of these research questions are now presented.

The compressed development strategy. The compressed development strategy is the more formal, traditional method of creating new products by having innovation teams follow procedures, shorten procedural time frames, and examine steps for compressing the amount of time to produce a new innovation (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995).
Through testing the hypotheses using path analysis, sufficient evidence indicated that the compressed development strategy was explained by the vision, task orientation, and support for innovation dimensions of TTCI. The eight-path model was deemed useful for reporting the results and had acceptable NFI, CFI, and IFI indices as reported in Chapter 4. However, the eight-path model also failed to meet established requirements on GFI and AGFI. In accordance with Hu and Bentler (1998), the eight-path model had an acceptable SRMR but did not meet the minimum recommendation for this index by Diamantopoulos and Siguaw (2000). The three endogenous paths were significant in explaining the exogenous construct of compressed strategy.

Vision is the clarity of goals for the team and recognition that the team understands the goals and embraces the goals. Task orientation is where team members perceive that task assignments are useful, monitored, and build upon each other. Support for innovation is the perception that the team has necessary support both within the team and provided by the company to achieve innovation.

The experiential development strategy. In contrast to the compression strategy, the experiential development strategy is rapidly building new ideas through intuition and flexible options in order to learn quickly about and shift with uncertain market environments providing a more effective team innovation process for unique products (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995).

The hypotheses were tested using path analysis (Table 30). There was insufficient evidence to indicate that the experiential development strategy was explained by the participative safety and support for innovation dimensions of the TTCI.

Structural model comparisons. The framework for testing structural equation models has several scenarios (Jöreskog and Sörbom 1993). This research uses the strictly confirmatory (SC)
scenario, where the researcher postulates a theory, collects appropriate data, and then tests the fit of the hypothesized model to the collected data. The SC scenario was the testing of a five-path structure supported by theory explained in Chapters 2 and 3.

Multicollinearity in the data, likely caused by a common method bias, made obtaining a proper fit difficult with the five-path model. Taking an alternative model approach to testing structural equation models requires hypotheses grounded in theory and is a relatively uncommon practice (Byrne 1998; MacCallum, Roznowski, and Necowitz 1992), so a hierarchical model approach for model comparison was chosen. A hierarchical model approach intends that one model is a subset of the other (Kline 2005).

An eight-path model was tested among the latent constructs. Only five of the eight paths were supported in theory. As MacCallum, Roznowski, and Necowitz (1992) state: “No model fits real-world phenomena exactly.” The use of data collected among employees in CPG for this study certainly supports MacCallum et al.’s (1992) assertion. The eight-path model was deemed a better fit due to a lower chi-square and better fit indices for NFI, CFI, IFI, and SRMR fit indices over the five-path model (Table 29).

Taking a rigorous approach to discriminant validity, two tests were conducted to determine the discriminant validity of the latent constructs. Test one indicated that measures discriminate to measure their intended construct and no other construct with two exceptions. The items for the exogenous construct, support for innovation, did not discriminate with the items for the endogenous construct, experiential strategy.

The second test of discriminant validity, considered by Hair et al (2006) as the better test of discriminant validity, is a comparison of variance-extracted percentages for any two constructs with the square of the correlation estimate between those to constructs. The
expectation on this second discriminant test is that the variance extracted for each construct in the pair is greater than the squared correlation of the pair. Only the items for vision discriminate on this second, considered better test (Hair et al. 2006), of discriminant validity.

Discussion

The results of the present study have implications for theory development and managerial practice.

*Theoretical implications.* The results of this study indicate potential internal team characteristics that are measurable to indicate what type of development strategy a firm uses for innovation. These findings extend the use of the TTCI to help explain the development strategies used by a company. The compressed development strategy is explained by the items that measure vision, task orientation, and support for innovation from TTCI. The theoretical implications are:

1) the TTCI (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998) and its associated measures are useful to determine if a firm has the team characteristics to speed up their innovation time;
2) the items for TTCI (Anderson and West 1999; Anderson and West 1996; Anderson and West 1998), tested and used in service industries, appear useful for research in tangible product industries only as they apply to compressed development; and
3) the items measuring development strategies (Callahan and Moretton 2001; Eisenhardt and Tabrizi 1995) appear useful for research in tangible product industries only as they apply to compressed development.
Managerial implications. Companies have found that their new primary source for sustainable revenue growth comes from creating new innovations, not from mergers and acquisitions (Leavy 2005). Two development strategy approaches found by Eisenhardt and Tabrizi (1995) indicate that a company can either 1) speed up the development of their innovations by shortening their current processes or 2) take an intuitive/flexible means to creating products faster. Teams that innovate are comprised of several characteristics for success (West and Altink 1996). The results of this study offer helpful clues for companies that depend on innovations for sustainable revenue growth. The implications of this study to company managers are:

1) aid companies in hiring considerations for new employees to fit strategy,
2) audit team membership among teams that innovate to determine if the team characteristics match development strategy plans,
3) lower the failure rate of innovation teams in terms of team success in working together and in producing ideas that meet company goals, and
4) potentially increase the overall number of innovations generated by having team characteristics that match company development goals.

The results have little to contribute in terms of explaining how companies can have an intuitive/flexible, non-traditional development strategy.

Contributions. The results of the present study make meaningful contributions in the following ways:

1) The measures TTCI were modified to use in tangible product industries. Prior to this study, the 33 items drawn for a priori use in multiple studies were found useful in
service industries. This study is the first to adapt the scales for use in tangible products innovation.

2) The measures for the development strategy dimensions, compressed and experiential, were modified to use in tangible product industries. Prior to this study, measures used in this study were found useful in high-tech industries. This study is the first attempt at using established measures for the TTCI for use in tangible products innovation.

3) The bulk of the work to create new scale items for the development strategy dimensions in testing with tangible products is complete. These scale items went through rigorous testing with experts. The new scale items demonstrated reliability through both Cronbach alpha, split-half, and convergent tests. Since the measures did not pass discriminant validity tests, further testing is required.

4) The large sample size from a third-party research vendor provided a unique setting. The contribution to theory and the outcome of the results from this study still need testing using other settings and methods of data collection.

5) A contribution through the use of structural equation modeling extends TTCI as useful in explaining a compressed development strategy.

Limitations. Despite the advantages offered by the proposed research, several limitations must be noted. The first of the limitations has to do with the sample employed for this study. The sample from the research vendor was noted as a limitation. While the interest was high in having support from a research firm in CPG, restricting participants to only consumer products manufacturers may have created a more than usual homogeneous grouping.

Second, given the nature and speed of data collection used by the CPG research vendor, reversing items was considered but not used in instrumentation. Reversing items may have
helped avoid the high multicollinearity among the responses received from the participants in the data collection.

Third, the method of data collection was noted as a limitation. The participant’s experience, where the participants responded to each item at the same time, was noted as a contextual problem. The contextual experience shared by the respondents is one of the known underlying causes for common method bias according to Podsakoff et al. (2003).

Fourth, constructs did not pass both discriminant validity tests prescribed by Hair et al. (2006). Common method variance was found in the data, which contributes to the problem with discriminant validity. High multicollinearity was also found in the data, which contributes to the discriminant problem.

Discriminant validity issues make interpretation of the results problematic (Hair et al. 2006). Multicollinearity in construct measures contributes to ill-fitted models (Kline 2005). A common method bias causes a systematic error variance that can have a serious confounding influence on empirical results (Campbell and Fiske 1959). The results of the hypotheses tests were considered with these problems with the data.

Recommendations for Future Research

The present study opens the door to many possibilities for future research. The overall recommendation involves additional replication and improved methods. Details of these future research directions are now expressed.

Several types of replication are necessary to enhance the theory development
undertaken in the present study. As Campbell and Stanley (1963) suggest, multiple types of samples should be used to determine the generalizability of the findings regarding hypotheses. Additional samples in tangible products industries are recommended.

The present study has several methodological recommendations for future studies. The primary recommendation is about the data collection method. Future research methods are suggested to mitigate common method bias. Procedures recommended by Podsakoff et al. (2003) can help mitigate common method variance. The second recommendation regarding data collection is to minimize multicollinearity. Procedures by Grewal et al. (2004) are helpful to reduce multicollinearity in data. Using a pro-bono third-party research vendor, while on the one hand benefited the ability to obtain data, prevented the use of methods to help control bias introduced in the data collection effort. A final area for future research involves extending the use of the TTCI to other testable areas of product innovation.

Summary

Chapter 5 summarized the results and implications of the present study. The results support that TTCI and its measures are useful for explaining development strategies in a tangible products industry, i.e. consumer packaged goods. Although the hypotheses posed for explaining experiential development strategy were not supported, the hypotheses for the compressed development strategy were supported. This indicates the usefulness of the measures for vision, task orientation, and support for innovation from TTCI.

Finally, several limitations were addressed, and directions for future research were explicated. Therefore, the present study offers contributions in terms of extending theoretical
development in current research streams, as well as offering guidance for continued development.
References


Campbell, Donald T. and Donald W. Fiske (1959), "Convergent and discriminant validation by the multitrait-multimethod matrix," Psychological Bulletin, 56 (2), 81-105.


## TABLE 1

Measures for Team Climate in Innovation Dimensions

<table>
<thead>
<tr>
<th>Vision items:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td># This team’s objectives are:</td>
<td></td>
</tr>
<tr>
<td>V1</td>
<td>clear to team members.</td>
</tr>
<tr>
<td>V2</td>
<td>useful to team members.</td>
</tr>
<tr>
<td>V3</td>
<td>appropriate to team members.</td>
</tr>
<tr>
<td>V4</td>
<td>clearly understood by members of the team.</td>
</tr>
<tr>
<td>V5</td>
<td>achievable by the team.</td>
</tr>
<tr>
<td>V6</td>
<td>worthwhile to me.</td>
</tr>
<tr>
<td>V7</td>
<td>worthwhile to the organization.</td>
</tr>
<tr>
<td>V8</td>
<td>realistic.</td>
</tr>
<tr>
<td>V9</td>
<td>attainable</td>
</tr>
<tr>
<td>V10</td>
<td>Team members agree with this team’s objectives.</td>
</tr>
<tr>
<td>V11</td>
<td>Team members are committed to this team’s objectives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task Orientation items:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td># My team members:</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>provide useful ideas to help achieve team tasks.</td>
</tr>
<tr>
<td>T2</td>
<td>help me to work to the best of my ability.</td>
</tr>
<tr>
<td>T3</td>
<td>maintain a higher standard of work by monitoring each other.</td>
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<tr>
<td>T4</td>
<td>are willing to question the basis of what the team is doing.</td>
</tr>
<tr>
<td>T5</td>
<td>build on each other’s ideas to achieve the best possible outcome.</td>
</tr>
<tr>
<td>T6</td>
<td>are concerned with achieving the highest standards of performance for the team.</td>
</tr>
<tr>
<td>T7</td>
<td>utilize clear criteria to achieve excellence.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Support for Innovation items:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td># My team members:</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>are encouraged to develop new ideas.</td>
</tr>
<tr>
<td>S2</td>
<td>assist each other in developing new ideas.</td>
</tr>
<tr>
<td>S3</td>
<td>take the time needed to develop new ideas.</td>
</tr>
<tr>
<td>S4</td>
<td>share resources to help apply new ideas.</td>
</tr>
<tr>
<td>S5</td>
<td>provide practical support for the application of new ideas.</td>
</tr>
<tr>
<td>S6</td>
<td>support openness to change.</td>
</tr>
<tr>
<td>S7</td>
<td>support searching for fresh, new ways of looking at problems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participative Safety items:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td># My team members:</td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>share information with each other.</td>
</tr>
<tr>
<td>P2</td>
<td>have a ‘we are in it together’ attitude.</td>
</tr>
<tr>
<td>P3</td>
<td>are open to making suggestions to other team members.</td>
</tr>
<tr>
<td>P4</td>
<td>keep each other informed about team-related issues.</td>
</tr>
<tr>
<td>P5</td>
<td>feel accepted by each other.</td>
</tr>
<tr>
<td>P6</td>
<td>feel understood by each other.</td>
</tr>
<tr>
<td>P7</td>
<td>listen to other team member’s views, even if they are in the minority.</td>
</tr>
<tr>
<td>P8</td>
<td>feel there is a lot of ‘give and take’ among my team.</td>
</tr>
</tbody>
</table>

SOURCE: Final instrument
## TABLE 2

Measure for Development Strategy Dimensions

<table>
<thead>
<tr>
<th>Compressed Development Strategy items:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>My team:</td>
</tr>
<tr>
<td>C1</td>
<td>spent significant time planning future actions to meet team objectives.</td>
</tr>
<tr>
<td>C2</td>
<td>followed a series of well-defined steps to meet team objectives.</td>
</tr>
<tr>
<td>C3</td>
<td>shortened development time by overlapping steps.</td>
</tr>
<tr>
<td>C4</td>
<td>was rewarded for meeting schedule deadlines during the course of the project.</td>
</tr>
<tr>
<td>C5</td>
<td>shortened the usual development time by planning each process step.</td>
</tr>
<tr>
<td>C6</td>
<td>sequenced development steps to shorten development time.</td>
</tr>
<tr>
<td>C7</td>
<td>members were drawn from multi-functional areas within the organization.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Experiential Development Strategy items:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>My team:</td>
</tr>
<tr>
<td>E1</td>
<td>accelerated the development process by simultaneously considering alternative designs/options.</td>
</tr>
<tr>
<td>E2</td>
<td>tested various alternative designs/options during the development process.</td>
</tr>
<tr>
<td>E3</td>
<td>conducted frequent formal evaluation reviews (benchmarks) during the development process.</td>
</tr>
<tr>
<td>E4</td>
<td>was motivated to keep a certain ‘pace’ of development.</td>
</tr>
<tr>
<td>E5</td>
<td>achieved more design options than teams using predictable steps.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My team members:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E6</td>
<td>are given freedom to experiment with new ideas.</td>
</tr>
<tr>
<td>E7</td>
<td>are encouraged to take risks when trying new ideas.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Among my team members:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E8 errors are considered as a source of learning.</td>
<td></td>
</tr>
<tr>
<td>E9 there is room for initiative.</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Final instrument
TABLE 3
Descriptive Statistics for Vision Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Wording</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>clear to team members.</td>
<td>281</td>
<td>7.19</td>
<td>2.24</td>
<td>-0.65</td>
<td>-0.21</td>
</tr>
<tr>
<td>V2</td>
<td>useful to team members.</td>
<td>281</td>
<td>7.59</td>
<td>2.02</td>
<td>-1.10</td>
<td>1.09</td>
</tr>
<tr>
<td>V3</td>
<td>appropriate to team members.</td>
<td>281</td>
<td>7.46</td>
<td>1.83</td>
<td>-0.75</td>
<td>1.55</td>
</tr>
<tr>
<td>V4</td>
<td>clearly understood by members of the team.</td>
<td>281</td>
<td>7.41</td>
<td>2.05</td>
<td>-0.59</td>
<td>0.07</td>
</tr>
<tr>
<td>V5</td>
<td>achievable by the team.</td>
<td>280</td>
<td>7.95</td>
<td>1.93</td>
<td>-1.38</td>
<td>3.07</td>
</tr>
<tr>
<td>V6</td>
<td>worthwhile to me.</td>
<td>281</td>
<td>7.82</td>
<td>2.28</td>
<td>-1.52</td>
<td>2.23</td>
</tr>
<tr>
<td>V7</td>
<td>worthwhile to the organization.</td>
<td>281</td>
<td>8.00</td>
<td>1.99</td>
<td>-1.36</td>
<td>1.90</td>
</tr>
<tr>
<td>V8</td>
<td>realistic.</td>
<td>281</td>
<td>7.91</td>
<td>1.78</td>
<td>-1.04</td>
<td>1.73</td>
</tr>
<tr>
<td>V9</td>
<td>attainable.</td>
<td>281</td>
<td>7.79</td>
<td>1.83</td>
<td>-1.17</td>
<td>2.39</td>
</tr>
<tr>
<td>V10</td>
<td>Team members agree with this team’s objectives.</td>
<td>281</td>
<td>7.11</td>
<td>1.82</td>
<td>-0.58</td>
<td>0.68</td>
</tr>
<tr>
<td>V11</td>
<td>Team members are committed to this team’s objectives.</td>
<td>281</td>
<td>7.66</td>
<td>1.97</td>
<td>-0.87</td>
<td>0.65</td>
</tr>
</tbody>
</table>

SOURCE: SPSS and final instrument.

TABLE 4
Descriptive Statistics for Task Orientation Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Wording</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>provide useful ideas to help achieve team tasks.</td>
<td>281</td>
<td>7.49</td>
<td>1.82</td>
<td>-1.18</td>
<td>2.06</td>
</tr>
<tr>
<td>T2</td>
<td>help me to work to the best of my ability.</td>
<td>281</td>
<td>7.49</td>
<td>2.03</td>
<td>-0.89</td>
<td>0.46</td>
</tr>
<tr>
<td>T3</td>
<td>maintain a higher standard of work by monitoring each other.</td>
<td>281</td>
<td>7.20</td>
<td>2.18</td>
<td>-0.66</td>
<td>-0.20</td>
</tr>
<tr>
<td>T4</td>
<td>are willing to question the basis of what the team is doing.</td>
<td>281</td>
<td>7.42</td>
<td>1.97</td>
<td>-0.93</td>
<td>0.74</td>
</tr>
<tr>
<td>T5</td>
<td>build on each other’s ideas to achieve the best possible outcome.</td>
<td>281</td>
<td>7.54</td>
<td>2.03</td>
<td>-1.23</td>
<td>1.33</td>
</tr>
<tr>
<td>T6</td>
<td>are concerned with achieving the highest standards of performance for the team.</td>
<td>281</td>
<td>7.75</td>
<td>2.17</td>
<td>-1.39</td>
<td>1.27</td>
</tr>
<tr>
<td>T7</td>
<td>utilize clear criteria to achieve excellence.</td>
<td>281</td>
<td>7.34</td>
<td>2.10</td>
<td>-0.97</td>
<td>0.52</td>
</tr>
</tbody>
</table>

SOURCE: SPSS
TABLE 5
Descriptive Statistics for Support for Innovation Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Wording</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>are encouraged to develop new ideas.</td>
<td>281</td>
<td>8.04</td>
<td>1.83</td>
<td>-1.40</td>
<td>2.89</td>
</tr>
<tr>
<td>S2</td>
<td>assist each other in developing new ideas.</td>
<td>281</td>
<td>7.60</td>
<td>2.04</td>
<td>-1.07</td>
<td>1.03</td>
</tr>
<tr>
<td>S3</td>
<td>take the time needed to develop new ideas.</td>
<td>281</td>
<td>6.85</td>
<td>2.41</td>
<td>-0.56</td>
<td>-0.67</td>
</tr>
<tr>
<td>S4</td>
<td>share resources to help apply new ideas.</td>
<td>281</td>
<td>7.36</td>
<td>2.06</td>
<td>-0.92</td>
<td>0.64</td>
</tr>
<tr>
<td>S5</td>
<td>provide practical support for the application of new ideas.</td>
<td>281</td>
<td>7.27</td>
<td>2.06</td>
<td>-0.77</td>
<td>0.50</td>
</tr>
<tr>
<td>S6</td>
<td>support openness to change.</td>
<td>281</td>
<td>7.16</td>
<td>2.21</td>
<td>-1.25</td>
<td>1.67</td>
</tr>
<tr>
<td>S7</td>
<td>support searching for fresh, new ways of looking at problems.</td>
<td>281</td>
<td>7.18</td>
<td>2.11</td>
<td>-0.98</td>
<td>1.04</td>
</tr>
</tbody>
</table>

SOURCE: SPSS

TABLE 6
Descriptive Statistics for Participative Safety Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Wording</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>share information with each other.</td>
<td>281</td>
<td>7.47</td>
<td>2.29</td>
<td>-1.37</td>
<td>1.62</td>
</tr>
<tr>
<td>P2</td>
<td>have a ‘we are in it together’ attitude.</td>
<td>281</td>
<td>7.28</td>
<td>2.36</td>
<td>-1.33</td>
<td>1.25</td>
</tr>
<tr>
<td>P3</td>
<td>are open to making suggestions to other team members.</td>
<td>281</td>
<td>7.59</td>
<td>2.01</td>
<td>-1.31</td>
<td>2.04</td>
</tr>
<tr>
<td>P4</td>
<td>keep each other informed about team-related issues.</td>
<td>281</td>
<td>7.44</td>
<td>2.20</td>
<td>-1.43</td>
<td>2.17</td>
</tr>
<tr>
<td>P5</td>
<td>feel accepted by each other.</td>
<td>281</td>
<td>7.56</td>
<td>2.40</td>
<td>-1.37</td>
<td>1.42</td>
</tr>
<tr>
<td>P6</td>
<td>feel understood by each other.</td>
<td>281</td>
<td>7.26</td>
<td>2.30</td>
<td>-1.31</td>
<td>1.36</td>
</tr>
<tr>
<td>P7</td>
<td>listen to other team member’s views, even if they are in the minority.</td>
<td>281</td>
<td>7.46</td>
<td>2.14</td>
<td>-1.41</td>
<td>1.79</td>
</tr>
<tr>
<td>P8</td>
<td>feel there is a lot of ‘give and take’ among my team.</td>
<td>281</td>
<td>7.11</td>
<td>2.19</td>
<td>-1.34</td>
<td>1.71</td>
</tr>
</tbody>
</table>

SOURCE: SPSS
TABLE 7

Descriptive Statistics for Compressed Strategy Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Wording</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>My team:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>spent significant time planning future actions to meet team objectives.</td>
<td>281</td>
<td>7.42</td>
<td>1.92</td>
<td>-0.59</td>
<td>0.51</td>
</tr>
<tr>
<td>C2</td>
<td>followed a series of well-defined steps to meet team objectives.</td>
<td>281</td>
<td>6.97</td>
<td>2.08</td>
<td>-0.48</td>
<td>-0.05</td>
</tr>
<tr>
<td>C3</td>
<td>shortened development time by overlapping steps.</td>
<td>281</td>
<td>6.88</td>
<td>2.54</td>
<td>-0.82</td>
<td>-0.24</td>
</tr>
<tr>
<td>C4</td>
<td>was rewarded for meeting schedule deadlines during the course of the project.</td>
<td>281</td>
<td>6.94</td>
<td>2.44</td>
<td>-0.78</td>
<td>-0.21</td>
</tr>
<tr>
<td>C5</td>
<td>shortened the usual development time by planning each process step.</td>
<td>281</td>
<td>6.38</td>
<td>2.94</td>
<td>-0.79</td>
<td>-0.55</td>
</tr>
<tr>
<td>C6</td>
<td>sequenced development steps to shorten development time.</td>
<td>281</td>
<td>6.73</td>
<td>2.70</td>
<td>-1.04</td>
<td>0.09</td>
</tr>
<tr>
<td>C7</td>
<td>members were drawn from multi-functional areas within the organization.</td>
<td>281</td>
<td>7.43</td>
<td>2.48</td>
<td>-1.10</td>
<td>0.39</td>
</tr>
</tbody>
</table>

SOURCE: SPSS

TABLE 8

Descriptive Statistics for Experiential Development Strategy

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Wording</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>My team:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>accelerated the development process by simultaneously considering alternative designs/options.</td>
<td>281</td>
<td>7.36</td>
<td>2.44</td>
<td>-1.04</td>
<td>0.36</td>
</tr>
<tr>
<td>E2</td>
<td>tested various alternative designs/options during the development process.</td>
<td>281</td>
<td>7.03</td>
<td>2.25</td>
<td>-1.06</td>
<td>0.56</td>
</tr>
<tr>
<td>E3</td>
<td>conducted frequent formal evaluation reviews (benchmarks) during the development process.</td>
<td>281</td>
<td>6.70</td>
<td>2.25</td>
<td>-0.69</td>
<td>0.15</td>
</tr>
<tr>
<td>E4</td>
<td>was motivated to keep a certain ‘pace’ of development.</td>
<td>281</td>
<td>7.43</td>
<td>1.95</td>
<td>-1.03</td>
<td>1.77</td>
</tr>
<tr>
<td>E5</td>
<td>achieved more design options than teams using predictable steps.</td>
<td>281</td>
<td>6.82</td>
<td>2.23</td>
<td>-0.77</td>
<td>-0.04</td>
</tr>
</tbody>
</table>

My team members:

| E6     | are given freedom to experiment with new ideas.                                              | 281| 7.51| 2.19| -1.21    | 1.35     |
| E7     | are encouraged to take risks when trying new ideas.                                          | 281| 7.07| 2.41| -0.90    | 0.25     |

Among my team members:

| E8     | errors are considered as a source of learning.                                               | 280| 6.95| 2.19| -0.94    | 1.15     |
| E9     | there is room for initiative.                                                                | 279| 8.06| 2.03| -1.42    | 1.98     |

SOURCE: SPSS
### TABLE 9
Sample Characteristics – Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 24</td>
<td>26</td>
<td>9.3%</td>
</tr>
<tr>
<td>25-39</td>
<td>125</td>
<td>44.5%</td>
</tr>
<tr>
<td>40-54</td>
<td>89</td>
<td>31.7%</td>
</tr>
<tr>
<td>55-64</td>
<td>40</td>
<td>14.2%</td>
</tr>
<tr>
<td>65-74</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>over 75</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>missing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>281</td>
</tr>
</tbody>
</table>

SOURCE: Research Firm

### TABLE 10
Sample Characteristics – Ethnicity

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic or Latino Origin</td>
<td>37</td>
<td>13.2%</td>
</tr>
<tr>
<td>American Indian</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Asian Origin</td>
<td>20</td>
<td>7.1%</td>
</tr>
<tr>
<td>Native Hawaiian or Pacific Islands</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>African American or African Origin</td>
<td>43</td>
<td>15.3%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>155</td>
<td>55.2%</td>
</tr>
<tr>
<td>Other</td>
<td>23</td>
<td>8.2%</td>
</tr>
<tr>
<td>missing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>281</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Research Firm
### TABLE 11

**Sample Characteristics – Education**

<table>
<thead>
<tr>
<th>Education</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS or GED</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Some College &lt; 1 year</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Some College &gt;1 yr no degree</td>
<td>89</td>
<td>31.7%</td>
</tr>
<tr>
<td>Associates Degree</td>
<td>44</td>
<td>15.7%</td>
</tr>
<tr>
<td>Bachelors Degree</td>
<td>60</td>
<td>21.4%</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>80</td>
<td>28.5%</td>
</tr>
<tr>
<td>Doctorate Degree</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>missing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>281</strong></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** Research Firm

### TABLE 12

**Sample Characteristics – Department/Role in Company**

<table>
<thead>
<tr>
<th>Department</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>25</td>
<td>8.9%</td>
</tr>
<tr>
<td>Human Resources</td>
<td>12</td>
<td>4.3%</td>
</tr>
<tr>
<td>Management</td>
<td>125</td>
<td>44.5%</td>
</tr>
<tr>
<td>Marketing</td>
<td>36</td>
<td>12.8%</td>
</tr>
<tr>
<td>Project Mgmt</td>
<td>45</td>
<td>16.0%</td>
</tr>
<tr>
<td>Logistics</td>
<td>5</td>
<td>1.8%</td>
</tr>
<tr>
<td>Production</td>
<td>31</td>
<td>11.0%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>281</strong></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** Research Firm
### TABLE 13

**Sample Characteristics – Length of Work History**

<table>
<thead>
<tr>
<th>How Long Worked</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than Year</td>
<td>49</td>
<td>17.4%</td>
</tr>
<tr>
<td>1-2 years</td>
<td>105</td>
<td>37.4%</td>
</tr>
<tr>
<td>3-4 years</td>
<td>57</td>
<td>20.3%</td>
</tr>
<tr>
<td>5-10 years</td>
<td>56</td>
<td>19.9%</td>
</tr>
<tr>
<td>11-20 years</td>
<td>8</td>
<td>2.8%</td>
</tr>
<tr>
<td>21 years or more</td>
<td>6</td>
<td>2.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>281</strong></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** Research Firm

### TABLE 14

**Sample Characteristics – Knowledge About Product Development**

<table>
<thead>
<tr>
<th>&quot;I am very knowledgeable about how most product development teams function at my Company.&quot;</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2.5%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1.8%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2.5%</td>
</tr>
<tr>
<td>Neither Agree or Disagree</td>
<td>26</td>
<td>9.3%</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>8.2%</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>17.1%</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>25.6%</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>14.2%</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>48</td>
<td>17.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>281</strong></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** SPSS
### TABLE 15
Sample Characteristics – Experience in Product Development

<table>
<thead>
<tr>
<th>I consider myself a ‘veteran’ in terms of my experience in product development teams at my Company.</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>9</td>
<td>3.2%</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>2.5%</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>1.8%</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>2.5%</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>7.8%</td>
</tr>
<tr>
<td>Neither Agree or Disagree</td>
<td>15</td>
<td>5.3%</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
<td>6.0%</td>
</tr>
<tr>
<td>7</td>
<td>35</td>
<td>12.5%</td>
</tr>
<tr>
<td>8</td>
<td>53</td>
<td>18.9%</td>
</tr>
<tr>
<td>9</td>
<td>55</td>
<td>19.6%</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>56</td>
<td>19.9%</td>
</tr>
<tr>
<td>Total</td>
<td>281</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: SPSS

### TABLE 16
Sample Characteristics – Perceived Confidence In How Product Teams Function

<table>
<thead>
<tr>
<th>I feel confident answering questions on how most product development teams function at my Company.</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>2.5%</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>4.6%</td>
</tr>
<tr>
<td>4</td>
<td>21</td>
<td>7.5%</td>
</tr>
<tr>
<td>Neither Agree or Disagree</td>
<td>32</td>
<td>11.4%</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>1.8%</td>
</tr>
<tr>
<td>7</td>
<td>47</td>
<td>16.7%</td>
</tr>
<tr>
<td>8</td>
<td>39</td>
<td>13.9%</td>
</tr>
<tr>
<td>9</td>
<td>46</td>
<td>16.4%</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>68</td>
<td>24.2%</td>
</tr>
<tr>
<td>Total</td>
<td>281</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: SPSS
TABLE 17  
Sample Characteristics – Perceived Experience In Product Teams  

<table>
<thead>
<tr>
<th>I feel I am an experienced participant in product development teams at my Company.</th>
<th>Number of Respondents</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>2.5%</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>4.3%</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>5.7%</td>
</tr>
<tr>
<td>Neither Agree or Disagree</td>
<td>11</td>
<td>3.9%</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>2.8%</td>
</tr>
<tr>
<td>7</td>
<td>64</td>
<td>22.8%</td>
</tr>
<tr>
<td>8</td>
<td>35</td>
<td>12.5%</td>
</tr>
<tr>
<td>9</td>
<td>63</td>
<td>22.4%</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>62</td>
<td>22.1%</td>
</tr>
<tr>
<td>Total</td>
<td>281</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: SPSS
### TABLE 18

Split-Half Reliability – Vision

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Part 1</th>
<th>Value</th>
<th>.958</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N of Items</td>
<td>6&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part 2</td>
<td>Value</td>
<td>.952</td>
</tr>
<tr>
<td></td>
<td>N of Items</td>
<td>5&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total N of Items</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Correlation Between Forms</td>
<td>Spearman-Brown Coefficient</td>
<td>Equal Length</td>
<td>.971</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unequal Length</td>
<td>.971</td>
</tr>
<tr>
<td>Guttman Split-Half Coefficient</td>
<td>.954</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> The items are: V_Clear, V_Useful, V_Appropriate, V_Clearly understood, V_Achievable, V_Worthwhile to me.

<sup>b</sup> The items are: V_Worthwhile to org, V_Realistic, V_Attainable, V_Team Agree, V_Team Committed.

### TABLE 19

Split-Half Reliability – Task Orientation

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Part 1</th>
<th>Value</th>
<th>.924</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N of Items</td>
<td>4&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part 2</td>
<td>Value</td>
<td>.955</td>
</tr>
<tr>
<td></td>
<td>N of Items</td>
<td>3&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total N of Items</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Correlation Between Forms</td>
<td>Spearman-Brown Coefficient</td>
<td>Equal Length</td>
<td>.939</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unequal Length</td>
<td>.940</td>
</tr>
<tr>
<td>Guttman Split-Half Coefficient</td>
<td>.931</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> The items are: T_Useful to task, T_Help me work, T_Maint higher std, T_Willing to Q.

<sup>b</sup> The items are: T_Build on EO, T_Concerned w High Std Perf, T_Utilize clear criterial.
### TABLE 20

Split-Half Reliability – Support For Innovation

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Part 1</th>
<th>Value</th>
<th>Part 2</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Items</td>
<td></td>
<td>.908</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Items</td>
<td>4&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td>3&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Correlation Between Forms</th>
<th>Spearman-Brown Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal Length</td>
<td>.965</td>
</tr>
<tr>
<td>Unequal Length</td>
<td>.966</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Guttman Split-Half Coefficient</th>
<th>.954</th>
</tr>
</thead>
</table>

<sup>a</sup> The items are: S_Encourage Dev New, S_Assist Dev New, S_Take Time Dev new, S_Share Resources Apply New.

<sup>b</sup> The items are: S_Provide Practical Support Apply New, S_Support Openness to Change, S_Support Searching.

### TABLE 21

Split-Half Reliability – Participative Safety

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Part 1</th>
<th>Value</th>
<th>Part 2</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>.960</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Items</td>
<td></td>
<td>4&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Items</td>
<td>4&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td>4&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Correlation Between Forms</th>
<th>Spearman-Brown Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal Length</td>
<td>.949</td>
</tr>
<tr>
<td>Unequal Length</td>
<td>.949</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Guttman Split-Half Coefficient</th>
<th>.949</th>
</tr>
</thead>
</table>

<sup>a</sup> The items are: P_Share Info, P_We are in it together, P_Open to Suggestions, P_Keep EO Informed.

<sup>b</sup> The items are: P_Feel Accepted, P_Feel Understood, P_Listen to other team, P_Feel Give & Take.
### TABLE 22

Split-Half Reliability – Compressed Strategy

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Part 1</th>
<th>Value</th>
<th>Part 2</th>
<th>Value</th>
<th>Total N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>.869</td>
<td>Value</td>
<td>.792</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N of Items</td>
<td>4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>N of Items</td>
<td>3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7</td>
</tr>
</tbody>
</table>

**Correlation Between Forms**

<table>
<thead>
<tr>
<th>Spearman-Brown Coefficient</th>
<th>Equal Length</th>
<th>Unequal Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.915</td>
<td>.916</td>
</tr>
</tbody>
</table>

**Guttman Split-Half Coefficient**

|                   | .911          |

<sup>a</sup> The items are: C_Time Planning, C_Well Defined Steps, C_Shortened Dev Time, C_Reward for Deadlines.

<sup>b</sup> The items are: C_Shortened Process Steps, C_Sequenced Dev Steps, C_Mem fr Multifunctional.

---

### TABLE 23

Split-Half Reliability – Experiential Strategy

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>Part 1</th>
<th>Value</th>
<th>Part 2</th>
<th>Value</th>
<th>Total N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>.908</td>
<td>Value</td>
<td>.903</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N of Items</td>
<td>5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>N of Items</td>
<td>4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>9</td>
</tr>
</tbody>
</table>

**Correlation Between Forms**

<table>
<thead>
<tr>
<th>Spearman-Brown Coefficient</th>
<th>Equal Length</th>
<th>Unequal Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.833</td>
<td>.834</td>
</tr>
</tbody>
</table>

**Guttman Split-Half Coefficient**

|                   | .823          |

<sup>a</sup> The items are: E_Accelerated Dev, E_Tested Various, E_Conducted Freq Reviews, E_Motivated to keep Pace, E_Achieved More Options.

<sup>b</sup> The items are: E_Given Freedom to Experiment, E_Encouraged take Risks, E_Errors considered
### TABLE 24
Construct Mean, Standard Deviation, Correlation Matrix, and Cronbach alpha’s (parenthesis)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vision</td>
<td>7.73</td>
<td>1.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(.96)</td>
</tr>
<tr>
<td>2. Task</td>
<td>7.36</td>
<td>1.79</td>
<td>.68 *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(.91)</td>
</tr>
<tr>
<td>3. Support for Innovation</td>
<td>7.46</td>
<td>1.84</td>
<td>.51 *</td>
<td>.93 *</td>
<td></td>
<td></td>
<td></td>
<td>(.90)</td>
</tr>
<tr>
<td>4. Participative Safety</td>
<td>7.35</td>
<td>2.12</td>
<td>.63 *</td>
<td>.94 *</td>
<td>.92 *</td>
<td></td>
<td></td>
<td>(.97)</td>
</tr>
<tr>
<td>5. Compressed Strategy</td>
<td>6.73</td>
<td>2.21</td>
<td>.76 *</td>
<td>.99 *</td>
<td>.95 *</td>
<td>.92 *</td>
<td></td>
<td>(.85)</td>
</tr>
<tr>
<td>6. Experiential Strategy</td>
<td>7.05</td>
<td>1.82</td>
<td>.63 *</td>
<td>.99 *</td>
<td>.91 *</td>
<td>.92 *</td>
<td>.97 *</td>
<td>(.86)</td>
</tr>
</tbody>
</table>

**SOURCE:** *p < .01, LISREL 8.8 Correlation Matrix of Eta and Ksi

**NOTE:** 11-point Likert scale with anchors 0, 5, and 10
### TABLE 25
Construct Reliability and Validity Checks:
Factor loadings and t-values from the standardized solution of the measurement model

<table>
<thead>
<tr>
<th>Items</th>
<th>Vision</th>
<th>Task</th>
<th>Support for Innovation</th>
<th>Participative Safety</th>
<th>Compressed</th>
<th>Experiential</th>
</tr>
</thead>
<tbody>
<tr>
<td>V6</td>
<td>.89</td>
<td>(19.1)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>V7</td>
<td>.89</td>
<td>(19.0)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>V8</td>
<td>.96</td>
<td>(21.8)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>V9</td>
<td>.97</td>
<td>(22.4)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>V10</td>
<td>.82</td>
<td>(16.7)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T1</td>
<td>-</td>
<td>-</td>
<td>.95</td>
<td>(21.4)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T3</td>
<td>-</td>
<td>-</td>
<td>.88</td>
<td>(18.6)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T4</td>
<td>-</td>
<td>-</td>
<td>.88</td>
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<tr>
<td>CR&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.96</td>
<td>.93</td>
<td>.85</td>
<td>.96</td>
<td>.89</td>
<td>.94</td>
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<tr>
<td>AVE&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.82</td>
<td>.76</td>
<td>.60</td>
<td>.79</td>
<td>.66</td>
<td>.74</td>
</tr>
<tr>
<td>HSV&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.81</td>
<td>.96</td>
<td>.84</td>
<td>.85</td>
<td>.84</td>
<td>.96</td>
</tr>
</tbody>
</table>

**SOURCE:** LISREL 8.8

**Notes:**
<sup>a</sup> CR = Composite Reliability, Hair et al. (2006)
<sup>b</sup> AVE = Average Variance Explained, Fornell & Larcker (1981)
<sup>c</sup> HSV = Highest Shared Variance, Hair et al. (2006)
<sup>d</sup> (t-values)
TABLE 26

Discriminant Validity Test 1

<table>
<thead>
<tr>
<th>Test*</th>
<th>Free</th>
<th>=1</th>
<th>Difference</th>
<th>Sig</th>
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<td>$\chi^2$</td>
<td>df</td>
<td>$\chi^2$</td>
<td>df</td>
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<tr>
<td>V &amp; T</td>
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<td>26</td>
<td>743.20</td>
<td>27</td>
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<tr>
<td>V &amp; S</td>
<td>343.18</td>
<td>26</td>
<td>705.05</td>
<td>27</td>
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<tr>
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<td>43</td>
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<td>44</td>
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<tr>
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<td>711.17</td>
<td>27</td>
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<td>V &amp; E</td>
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<td>748.26</td>
<td>35</td>
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<tr>
<td>T &amp; S</td>
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<td>19</td>
<td>231.62</td>
<td>20</td>
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<tr>
<td>T &amp; P</td>
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<td>454.99</td>
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<tr>
<td>T &amp; C</td>
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<td>291.46</td>
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<td>T &amp; E</td>
<td>485.81</td>
<td>26</td>
<td>512.65</td>
<td>27</td>
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<tr>
<td>S &amp; P</td>
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<td>445.50</td>
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<tr>
<td>P &amp; C</td>
<td>351.28</td>
<td>34</td>
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<td>35</td>
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<tr>
<td>P &amp; E</td>
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<td>43</td>
<td>637.23</td>
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<tr>
<td>C &amp; E</td>
<td>377.38</td>
<td>26</td>
<td>434.67</td>
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</table>

SOURCE: LISREL 8.80

Note*:
V = Vision
T = Task Orientation
S = Support for Innovation
P = Participative Safety
C = Compressed Strategy
E = Experiential Strategy
TABLE 27
Correlation Estimates

<table>
<thead>
<tr>
<th></th>
<th>VISION</th>
<th>TASK</th>
<th>SUPPORT</th>
<th>PARTICIP</th>
<th>COMP</th>
<th>EXPER</th>
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<td></td>
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<td>0.914</td>
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SOURCE: LISREL 8.8 Correlation Matrix of Eta and Ksi
TABLE 28
Discriminant Validity Test 2

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<th>2nd</th>
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<th>R²</th>
<th>AVE PAIRING</th>
<th>RESULT:</th>
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<td>PS</td>
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<td>0.40</td>
<td>0.82</td>
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<tr>
<td>V</td>
<td>C</td>
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<td>0.57</td>
<td>0.82</td>
<td>Pass</td>
</tr>
<tr>
<td>V</td>
<td>E</td>
<td>0.63</td>
<td>0.40</td>
<td>0.82</td>
<td>Pass</td>
</tr>
<tr>
<td>T</td>
<td>SI</td>
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<td>0.87</td>
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<tr>
<td>T</td>
<td>PS</td>
<td>0.94</td>
<td>0.89</td>
<td>0.76</td>
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<tr>
<td>T</td>
<td>C</td>
<td>0.99</td>
<td>0.98</td>
<td>0.76</td>
<td>Fail</td>
</tr>
<tr>
<td>T</td>
<td>E</td>
<td>0.99</td>
<td>0.98</td>
<td>0.76</td>
<td>Fail</td>
</tr>
<tr>
<td>SI</td>
<td>PS</td>
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<td>0.84</td>
<td>0.60</td>
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<tr>
<td>SI</td>
<td>C</td>
<td>0.95</td>
<td>0.91</td>
<td>0.60</td>
<td>Fail</td>
</tr>
<tr>
<td>SI</td>
<td>E</td>
<td>0.91</td>
<td>0.82</td>
<td>0.60</td>
<td>Fail</td>
</tr>
<tr>
<td>PS</td>
<td>C</td>
<td>0.92</td>
<td>0.84</td>
<td>0.79</td>
<td>Fail</td>
</tr>
<tr>
<td>PS</td>
<td>E</td>
<td>0.92</td>
<td>0.85</td>
<td>0.79</td>
<td>Fail</td>
</tr>
<tr>
<td>C</td>
<td>E</td>
<td>0.97</td>
<td>0.94</td>
<td>0.66</td>
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SOURCE: LISREL 8.8 Eta Ksi matix
TABLE 29

Model Fit Comparisons

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<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>χ²</th>
<th>df</th>
<th>p</th>
<th>CN</th>
<th>NFI</th>
<th>CFI</th>
<th>IFI</th>
<th>SRMR</th>
<th>GFI</th>
<th>AIC</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>ECVI</th>
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<td>0.928</td>
<td>0.0785</td>
<td>0.569</td>
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<td>0.168</td>
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<tr>
<td>Model-26</td>
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<td>0.927</td>
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</tbody>
</table>

Green highlight indicates meets fit requirements
Green outline indicates better comparative fit results
Red highlight indicates poor fit
Blue highlight indicates better comparative results

SOURCE: LISREL 8.8 Fit Indices report
## TABLE 30

### Path Analysis

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path</th>
<th>Standardized Path Coefficient</th>
<th>t-value</th>
<th>sig</th>
<th>Discriminant Test 1</th>
<th>Discriminant Test 2</th>
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<tbody>
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<td>H1</td>
<td>Vision ----&gt; Compressed</td>
<td>0.26</td>
<td>4.45</td>
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<td>pass</td>
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<td>H2</td>
<td>Task Orientation ----&gt; Compressed</td>
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<td>3.64</td>
<td>p&lt;.05</td>
<td>pass</td>
<td>fail</td>
</tr>
<tr>
<td>*</td>
<td>Participative Safety ----&gt; Compressed</td>
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<td>-2.51</td>
<td>p&lt;.05</td>
<td>pass</td>
<td>fail</td>
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<tr>
<td>H3</td>
<td>Support for Innovation ---&gt; Compressed</td>
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<td>2.96</td>
<td>p&lt;.05</td>
<td>pass</td>
<td>fail</td>
</tr>
</tbody>
</table>

* Vision ---> Experiential | -0.12 | **-1.84** | p=.06  | pass | fail
* Task Orientation ---> Experiential | 1.27  | 5.04      | p<.05  | pass | fail
H4 Participative Safety ---> Experiential | 0.00  | **-0.02** | p=.98  | pass | fail
H5 Support for Innovation ---> Experiential | -0.22 | **-1.15** | p=.25  | fail | fail

Note*: Not hypothesized path

**SOURCES**: LISREL 8.8 Gamma matrix for Completely Standardized Solution, t-values from Total Effects of Ksi & Eta
Significance default LISREL 8.8 and z-table
Discriminant tests from Tables 26 and 28
### TABLE 31

Correlation Coefficients

<table>
<thead>
<tr>
<th>Vision</th>
<th>Task Orientation</th>
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<th>Participative Safety</th>
<th>Compressed</th>
<th>Experiential</th>
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<td>.83 *</td>
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<td>.81 *</td>
<td>.85 *</td>
<td>.79 *</td>
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<td>.84 *</td>
<td>.86 *</td>
<td>.82 *</td>
<td>.80 *</td>
</tr>
</tbody>
</table>

SOURCE: *p < .01, LISREL 8.8 Phi Coefficient Matrix
FIGURE 1

Four-Factor Structure Theory of Team Climate in Innovation

SOURCE: Adapted from West (1990)
FIGURE 2

Illustration of the Four Factors of the Theory of Team Climate in Innovation and Development Strategies

SOURCE: West and Anderson (1994); Eisenhardt and Tabrizi (1995)
FIGURE 3
IRB Approval

SOURCE: UNT email
Hypothesized Relationships

SOURCE: Literature Review Chapter 2, Methods Chapter 3
FIGURE 5

Hypothesized Five-Path Structural Model

SOURCE: An original image made in AMOS 21.0
FIGURE 6

Hypothesized Eight-Path Structural Model

SOURCE: An original image made in AMOS 21.0
FIGURE 7

Correlations

SOURCE: An original image made in LISREL 8.8, $R^2$ values calculated from correlation matrix of Eta and Ksi