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Leadership and the Social Psychology of Lean Enterprise

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Lean Enterprise, Organizational Description Questionnaire, ODQ, Theory of Planned Behavior, TPB, Lean Measures, Leader-Member Exchange, LMX, Leadership, Culture, Transactional Leadership, Transformational Leadership, Lean Culture, Lean Goals

Abstract

Lean enterprise is the Toyota Production System applied not only in the production department but inside all organizational departments (finance, marketing, etc.). It focuses on continuously adding value to processes while improving efficiency and inputs management. No organization exists that has fully mastered the Lean ideology. Many like Toyota have applied it for decades and seen results, while others have seen none and abandon the chase. It is important to understand that leaders are an essential instrument for an effective and successful Lean implementation. Further, there are variables that affect a leader's behavior which in turn will have an impact on the organizational performance. In other words, different leadership styles will result in desirable or undesirable organizational outcomes. It is important for organizations striving for Lean improvements to have the most effective leadership in place. Thus, the purpose of this paper is to is to explore the variables interacting with leadership behavior and with a successful Lean implementation. Venturing into the future, this paper proposes a potential model of these interactions and a questionnaire measuring the separate variables.

Contents

1. Introduction

Lean enterprise has become a widely-used business method that optimizes customer value with fewer resources. The last few decades have seen a growing success and popularity of the term amongst business professional (Stone, 2012). That is until Liker (2004) simplifies the concept. He explains that Lean Enterprise is the end result of applying Lean thinking to all areas of a business. In their book, *Lean Thinking*, Womack and Jones (1996) describe Lean thinking as a paradigm that differentiates between waste and value within an organization. Waste is defined as "as any human activity which absorbs resources but creates no value" (p. 114); value is defined as "a capability provided to a customer at the right time at an appropriate price, as defined in each case by the customer" (p. 114). Lean Enterprise is applicable to all areas of a business—product development, marketing, accounting, and so forth (Liker, 2004)—and to all industries (Bruun & Mefford, 2004; Liker, 2004; Womack, Byrne, Fiume, Kaplan, & Toussaint., 2005; Womack & Jones, 1996).

Lean was born on the assembly line (lean.org, n.d.; Shah and Ward, 2007). In the early 1900s, Henry Ford became the first individual to integrate the assembly line into manufacturing (Lean.org, n.d.). His innovation brought about a more efficient method of production. However, it did not provide the variations demanded by a consumer-driven market. A few decades later, Kiichiro Toyoda, Taiichi Ōhno, and others at Toyota examined the situation from the consumer perspective. Through continuous effort, they successfully devised the Toyota Production System (TPS), a variety-friendly process that aims to reduce cost and increase efficiency (Lean.org, n.d.). The Toyota assembly was

born in response to the consumer's demand for variation in automobiles (Liker, 2004). While Ford's process was efficient, it did not allow for the range of products variety of the Toyota process. TPS produced parts that were assembled per order to satisfy the unique requirements of the customers (Lean.org, n.d.; Liker, 2004; Ōhno, 1988), while Ford's product specifications were limited to the T model and the color black. The flexibility found in TPS allowed production to adapt to shifts in market demand (Lean.org, n.d.; Ōhno, 1998). Ultimately, TPS produced a higher variety of quality products at a lower cost (Liker, 2004; Ōhno, 1988).

Decades later, when it sailed from Japan to America, TPS became branded as "Lean" (Jasti & Kodali, 2015; Stone, 2012). It has since been through a turmoil of misunderstanding and misapplication. Shah and Ward (2007) and Stone (2012) argue that the beginning of lean was obscured by articles altering the true nature of the Lean philosophy. Furthermore, it was misunderstood by managers who religiously focused on *elimination*, the single most visible aspect of Lean (Hampson, 1999; Liker, 2004; Radnor and Boaden, 2004; Shah and Ward, 2007; Ziskovsky and Ziskovsky, 2007). These events polluted the business world with divisive terms and philosophies (Shah and Ward, 2007; Stone, 2012). However, soon after Toyota's growing success, American's demanded tenable knowledge and understanding of Lean (Jasti & Kodali, 2015). Today, industries like healthcare and software development enjoy lean benefits with labels like "Lean Healthcare" and "Lean Software Development" (Graban, 2014).

Implementing lean enterprise will improve process efficiency, allowing smart usage of limited resources (MIT, 1996; Nightingale & Mize, 2002). This will provide the

lean user with a competitive advantage (Lewis, 2000; Nightingale & Mize, 2002; Pakdil & Leonard, 2014; Womack, Jones, & Roos, 1990). Competitiveness occurs as waste elimination results in increased flexibility, reduced expenses and lower price rates (Cuatrecasas Arbós, 2002; Wilson, 2010). Additionally, lean benefits can extend to the environment. For example, reducing waste in factories will consume less energy and reduce the emission of hazardous waste (Florida, 1996).

With all its benefits, it is not hard to fathom why so many companies are jumping into the pool of Lean Enterprise. Unfortunately, those who do not know how to swim become discouraged and disappointed as their efforts evaporate (Liker, 2004; Seddon and Caulkin, 2007). The inability to achieve desired results is due to the lack of appropriate leadership. The ideal leader is motivated and motivates others to commit to an effective implementation of lean enterprise. Ideally, this leader will transform the sum of organizational culture, vision, and values into an innovative environment. Different organizational cultures have unique effects on workers (Bass & Avolio, 1993). Likewise, different leaderships inspire unique levels of motivation from followers (Givens, 2008). The purpose of this paper is to identify the leadership style that most effectively utilizes Lean Enterprise.

2. Objective of the Study

1. Evaluate and measure the influence that various leadership styles have on Lean innovation and outcomes.
2. Identify the leadership style that most effectively utilizes Lean Enterprise to innovate, improve and maintain organizational performance.

3. Develop a broader understanding of the importance of leadership for a Lean transformation.

3. Review of Literature and Hypotheses Development

This study will investigate the impact that different leadership styles have on the leanness of a company. There are many studies that have measured the impact of leadership on performance (Breevaart et al., 2014; Dvir, Eden, Avolio, & Shamir, 2002; Givens, 2008; Howell & Hall-Merend, 1999; McColl-Kennedy & Anderson, 2002; Schaubroeck, Lam, & Cha, 2007; Ullah, 2013). There's ample literature attesting to the advantages of Lean Enterprise (Abdulmalek & Rajgopal, 2007; Billesbach, 1994; Liker, 2004, 1996; Manos, 2007; Nightingale & Mize, 2002; Nystuen, 2002; Oliver, 1996; Prizinsky, 2001; Sheridan, 2000; Taylor & Brunt, 2001; Wan & Chen, 2008), a few more attempting to measure it (Lean Advancement Initiative, 2001; Pakdil, & Leonard, 2014; Shah & Ward, 2007; Wan & Chen, 2008). Lastly, professionals from various industries have used the Theory of Planned Behavior (TPB) to predict behavior (Ajzen & Driver, 1992; Armitage & Conner, 1999; Beck & Ajzen, 1991; Chang, 1998; Godin & Kok, 1996; Pavlou & Fygenson, 2006). For the first time, TPB will join with leadership style and Lean Enterprise. No other research has yet attempted to measure the impact had by leader's behavior on the leanness of an organization. This research will provide answers to the question: Can leadership behavior and style affect the Leanness of an organization?

3.1. Transformational, Transactional, and Leader Member Exchange

In their research, Howell and Hall-Merenda (1999) demonstrate the importance of observing the leader-follower relationships and the leadership styles. Leader-follower relationships are measured by the LMX variables *affect*, *loyalty*, *contribution*, and *professional respect* (Barbuto & Hayden, 2011; Liden & Maslyn, 1998). The linkage between follower performance and the level of mutual trust, respect, and influence developed between followers and leaders (Howell & Hall-Merenda, 1999) determine the degree to which the LMX variables are high or low (Liden & Maslyn, 1998). For example, a follower's performance is increased by an affectionate and supporting leader who stimulates high levels of contribution.

Leadership styles are identified and measured by the Organizational Description Questionnaire (Bass & Avolio, 1992). This leader-focused study attempts to explain performance outcomes by analyzing specific leader behaviors (Howell & Hall-Merenda, 1999). Understanding the leadership styles is important as they form a foundation for LMX. There are two leadership styles—transformational and transactional. A pure transformational leadership is composed of the four I's: individualized consideration, intellectual stimulation, inspirational motivation, and idealized influence (Barbuto & Cummins-Brown, 2007). Respectively, these are the most effective and active leadership behaviors (Barbuto & Cummins-Brown, 2007). Under said leadership, followers are willing to go above and beyond contractual rewards, resulting in higher productivity and higher satisfaction (Barbuto & Cummins-Brown, 2007; Givens, 2008; Howell & Hall-Merenda, 1999). This is because transformational leaders invoke a sense of purpose and

family within followers (Bass & Avolio, 1993). On the other hand, pure transactional leadership is made up of the most passive and ineffective behaviors: laissez-faire, management-by-exception, contingent rewards (Barbuto & Cummins-Brown, 2007; Howell & Hall-Merenda, 1999; Breevaart et al., 2014). Although, it is important to note that contingent rewards' effectiveness can be increased when built on by the four I's (Barbuto & Cummins-Brown, 2007).

Transformational leadership and transactional leadership are not as simple as black and white. There are some shaded areas that bring mutual balance, allowing them to successfully coexist within an organization (Bass, 1998; Bass & Avolio, 1992; Graen & Uhl-Bien, 1995). To start, a transformational culture highly encourages and supports innovation (Bass, 1998). Goals set by leaders in this environment are taken as important components of the organization's vision (Bass & Avolio, 1992). However, a purely transformational leadership is not likely to be successful (Bass & Avolio, 1992). Thus, to be highly effective, it is must be founded on contingent rewards (transactional element) (Bass, 1998). Likewise, a purely transactional leadership is rarely successful. In such a culture, everything has a price and follower performance does not exceed price value (Bass & Avolio, 1992). In addition, transactional leaders are committed to as little change as possible (Bass & Avolio, 1992). For increased success and to increase performance effectiveness, an interaction is needed between the two leadership styles (Barbuto & Cummins-Brown, 2007).

LMX has two levels—high and low. The high level is most relatable to transformational leadership (Howell & Hall-Merenda, 1999). This is because they

mutually reflect many of the same attributes. For example, they both consist of mutual trust, respect, influence, and obligation (Graen & Uhl-Bien, 1995). In this environment leaders and followers are interdependent (Dunegan, Duchon, & Uhl-Bien, 1992), increasing follower's motivation to willingly undertake more responsibility towards achieving organizational goals (Graen & Uhl-Bien, 1995). The low-quality of LMX is most comparable to transactional leadership. This is because they are both characterized by a formal employment contract and personal detachment (Dunegan, Duchon, & Uhl-Bien, 1992).

The goal pursued by LMX is to generate effective leaders by training them to make their way up the quality scale (Graen & Uhl-Bien, 1991). LMX can be both transformational and transactional, as it is an evolvement from the latter to the first (Graen & Uhl-Bien, 1995). This all depends on the level of affect, loyalty, contribution and professional respect of the follower.

3.2. The Theory of Planned Behavior (TPB) and Leadership

The Theory of Planned Behavior (TPB) identifies the major variables that influence behavioral decisions (Ajzen, 2002; Francis et al., 2004; Conner & Armitage, 1998). Over the years, the TPB model has successfully measured and predicted a wide range of behaviors (Ajzen, 1991, 1996a; Conner & Sparks, 1996; Gordin & Kok, 1996; Pavlou & Fygenson, 2006; Rocheleau, 2013). Understanding the behavioral intention is the first step to predict a behavior. Although there is no direct relationship between behavioral intention and actual behavior, the intention is an approximate predictor of desired behavior (Francis et al., 2004). Three attitudes influence intention: attitude,

subjective norm, and perceived behavioral control (Azjen 1985; Krueger, 1993). Attitude is the individual's belief and judgment toward outcomes (Francis et al., 2004). Subjective norm is how the individual's social environment affects his or her evaluation of the behavior. It is impacted by the degree of importance the individual places on other's approval and judgment (Francis et al., 2004). The last component is the perceived behavioral control that measures the perception of one's ability to perform the behavior (Francis et al., 2004).

The target behavior measured in this study is defined in terms of TACT: Target, Action, Context and Time (Francis et l., 2004). Fishbein and Ajzen (1975) reasoned that intentions and behavior are most relatable when measured at equal specifications of target, action, context and time. In this paper, the target is *organizational performance*, the action is *utilizing Lean Enterprise*, the context is *for innovation, improvement, and maintenance*, and the time is measured *continuously*. Further, time must be narrowly defined (Ajzen, 2002) at short intervals to ensure that intention is unchanged (Randall & Wolff, 1994). Because of this, the more focused metric for *continuously* is the unceasing implementation of Lean Enterprise on *daily* decision making. In one sentence, the target leader behavior is to utilize Lean Enterprise to innovate, improve and maintain organizational performance".

Belief plays a major role in supplying leaders with the appropriate attributes needed to implement the target behavior. Attitude, subjective norms (SN) and perceived behavioral control (PBC) have the power to increase or decrease beliefs (Conner & Armitage, 1998). Beliefs, in turn, will increase or decrease behavioral intention (Conner

& Armitage, 1998). Further, intentions are an important predictor of behavior because it closely explains the phenomenon of human actions as a reflection of their intent to act (Pavlou & Fygenson, 2006). Two meta-analyses conducted by Sheppard, Hartwick, and Warshaw (1988) further supports the predictive effectiveness of intention. From 87 studies with a sample size of 11,566 at 0.01 level significance, they reported an acceptable correlation between intentions and behavior (Sheppard, Hartwick, & Warshaw 1988).

An individual's behavioral intentions capture the degree of effort they are willing to put into performing a behavior (Ajzen 1991). It is important for organizational leaders to have some degree of motivation to increase cultural efforts towards incorporating Lean Enterprise within overall decision making. Cultural efforts refer to the overall workplace environment taking on Lean thinking. As a rule of thumb, the greater the motivation, the greater the intention. The combination of favorable attitude, SN, and PBC positively influences the level of motivation a leader may possess (Ajzen, 2002). In turn, it will influence the level of motivation the culture emits (Givens, 2008).

Through his behavioral research, Ajzen (1985, 1991, 1996, 2002) has demonstrated that motivation is strengthened by the presence of a satisfactory degree of actual control over the behavior. When PBC increases, so does the likelihood of performing the desired behavior (Conner & Armitage, 1998; Ajzen, 2002). Seemingly, intentions occur immediately prior to behavior. With favorable attitude and SN, but without control, the intention may be abandoned (Conner & Armitage, 1998). However, depending on the degree of motivation, an individual may be willing to work harder to be

able to carry out the intention. In such instances, they might choose to revise the intention to fit changing circumstances (Beckmann & Kuhl, 1985).

To begin forming the intention of utilizing Lean Enterprise, leaders must have a favorable attitude towards the behavior. This is because leaders' attitude positively influences followers', or the culture's, attitudes (Givens, 2008; Howell & Hall-Merenda, 1999). Further, leaders must believe that performing the behavior will result in beneficial outcomes for the organization (Ajzen, 2002). In this instance, leaders should believe that Lean implementation will improve processes and outputs. Leaders must also believe that the act of performing the activity is pleasant (Ajzen, 2002). Enjoying the act of utilizing Lean will increase intention (Ajzen, 2002; Conner & Armitage, 1998; Pavlou & Fygenson, 2006) within the leader and, hence, the culture.

To further formulate intentions, leaders' beliefs must be fed by others in their professional and personal environment. TPB suggests that to perform target behavior individuals must feel some degree of social pressure (Conner & Armitage, 1998). A leader's peers will input different opinions that either approve or disapprove the behavioral intention (Ajzen, 2002). Thus, it is important for leaders to be in an environment where Lean implementation is the norm. If utilizing Lean Enterprise is the norm, motivation and intention are likely to increase (Conner & Armitage, 1998). An increase in attitude and SN means an increase in motivation which results in an increase in intention (Ajzen 1985, 1991, 2002; Conner & Armitage, 1998).

The last component needed to increase the intention is the leader's perceived control of the behavior (Azjen, 2002). Control captures individual's belief that

performing the behavior is or is not up to them (Azjen, 2002). Perceived control over the capability of exercising Lean Enterprise is achieved when the leader has access to the necessary resources and opportunities (Ajzen, 1991). Perceiving control over behavior will increase behavioral intention (Azjen, 1991).

Leaders' behavioral actions depend on the goals they seek to accomplish (Heider, 1958; Lewin, 1951). As individuals, they may choose to not perform a behavior or to what degree they will act out a behavior. Their efforts will reflect on their follower's efforts, and thus the culture (Bass & Avolio, 1992; Givens, 2008; Howell & Hall-Merenda, 1999; Schaubroeck et al., 2007). In extension, there are certain actions required for the achievement of leaders' goals (Beckmann & Kuhl, 1985). Take, for example, the goal of creating a Lean system. With this goal, we anticipate the need to specify customer value, identify and understand the value stream, eliminate no-value added steps, and so forth (Lean.org, n.d.). Goals are chosen based on organizational values. Some psychologists (e.g., Meglino & Ravlin, 1998; Rokeach, 1973) believe that values are powerful influencers of behavior.

Business literature scarcely addresses the conditions under which leadership is effective (Podsakoff, MacKenzie, & Bommer, 1996). Thus, this study will measure leader-follower relationships—transformational and transactional leaderships—from the behavioral viewpoint. The Leader-Member Exchange will also be used to measure the follower's level of affect, loyalty, contribution, and professional respect. These leadership styles have unique interactions with their environment. Equal factors affecting variables

of leaders' behavioral intentions' may result in different motivation levels and, thus, unique behavioral actions.

Transformational Leadership

The leader-follower relationship can be broken down into two types of leadership styles—transformational and transactional leadership (Howell & Hall-Merenda, 1999). To start, let us consider the most prominent of the two, transformational leadership. The full range leadership model (Barbuto & Cummins-Brown, 2007) describes transformational leadership as being considerate, motivational and influential. Research further demonstrates that the combination of all transformational leadership qualities results in greater organizational effectiveness as followers are more motivated to perform beyond expectations (Bass, 1985; Barbuto & Cummins-Brown, 2007).

Transformational leaders are by nature motivational. They start by appealing to their follower's emotions (Howell & Hall-Merenda, 1999). This allows them to motivate followers into accomplishing organizational goals (Bass, 1985). Transformational leaders' behavior is by nature highly motivational (Bass & Avolio, 1992). The more motivated a leader is, the more likely he/she will feel stimulated to motivate others into sharing their vision and mission (Bass, 1985). It is important to note that the Lean ideology fits with the transformational leadership qualities. These leaders motivate their followers to think outside of the box (Barbuto & Cummins-Brown, 2007) by challenging the traditional ways of behavior (Howell & Hall-Merenda, 1999) and discovering innovations (Bass & Avolio, 1992). Transformational leaders have the motivational charisma necessary to incorporate Lean Enterprise into an organizational culture (Bass,

1985; Barbuto & Cummins-Brown, 2007; Howell & Hall-Merenda, 1999). Hence, the positive direct effect of motivation on utilizing Lean Enterprise is strengthened by transformational leadership.

Hypothesis 1a: Transformational leadership behavior is positively related to the leader's Behavioral Intent to implement Lean.

To increase intention, the leader must believe the behavior to be both beneficial and enjoyable (Ajzen, 2002). Transformational leaders perceive continuous development and growth as favorable (Barbuto & Cummins-Brown, 2007). First, transformational leaders think that it is beneficial to improve organizational performance by developing new ideas to better achieve future goals (Howell & Hall-Merenda, 1999). Second, transformational leaders enjoy discovering better ways to perform (Barbuto & Cummins-Brown, 2007). Hence, they will enjoy taking the challenge of improving current and future effectiveness with Lean Enterprise.

Hypothesis 1b: Transformational leadership behavior is positively related to the leader's favorable attitudes toward implementing Lean practices.

The likelihood of behavioral performance increases when the SN variables, or norms and approval, increase (Azjen, 1991). The organizational culture embodies the organizational set of acceptable ideas and beliefs (Bass & Avolio, 1992). Thus, they are determinants of what is approved and expected. However, organizational cultures are difficult to change because they are almost solidly structured by the team's history and/or

the founder's beliefs, expectations and values (Bass & Avolio, 1992). Thus, it takes an exceptional leader to alter a culture's way of thinking to lean thinking while staying faithful to the organization's overall vision. Leaders are perceived as culture builders (Bass & Avolio, 1992; Wheelen, Hunger, Hoffman, & Bamford., 2014). Transformational leaders start by identifying and understanding the current culture to then realign it for improvements (Bass & Avolio, 1992). Hence, transformational leaders will produce transformational cultures that value innovation.

Hypothesis 1c: Transformational leadership behavior is positively related to the leader's favorable subjective norms toward implementing Lean Enterprise.

Transformational leaders inspire confidence (Podsakoff, MacKenzie, Moorman, & Fetter, 1990), as they behave per what they believe is "truly the right thing to do" (Barbuto & Cummins-Brown, 2007. p.2). These leaders are persistent and put all possible efforts into pursuing their objectives (Barbuto & Cummins-Brown, 2007). If necessary, they will push as far as realigning environmental variables to fit the circumstances (Beckmann & Kuhl, 1985). Just like motivation, the leader's confidence can have contagious effects (McNatt & Judge, 2004), such as spreading Lean thinking to the culture. Transformational leaders behave in ways that empower followers (Masi & Cooke, 2000). In extension, an empowered group of individuals will perceive control over performing as Lean innovators (Azjen, 1991; Schaubroeck et al., 2007), thus increasing overall behavioral intention and actual behavioral actions (Azen, 2002).

Hypothesis 1d: Transformational leadership behavior is positively related to the leader's favorable perceived behavioral control over implementing Lean Enterprise.

Transactional Leadership

The second leadership style of the leader-follower relationship is transactional leadership. It is important to note that leader behavior can sometimes reflect both transactional and transformational qualities (Bass & Avolio, 1992). Focusing on the pure state, a transactional leadership is highly driven by individualism (Bass & Avolio, 1993). Individualism leads to followers working towards their own interest, thus, neglecting organizational vision (Bass, 1998). Individuals put a price on motivation, leading to short term commitment, existent to the extent of rewards (Bass & Avolio, 1992). Because of this limited commitment, cultures under transactional leadership remain stagnant (Bass & Avolio, 1992). Disliking challenges to the status quo (Barbuto & Cummins-Brown, 2007) means that they behave per what has worked in the past (Bass & Avolio, 1992). As such, transactional leadership may constrain innovation. However, being in control of rewards (Howell & Hall-Merenda, 1999), can allow transactional leaders to motivate followers' self-interests and commitment towards lean enterprise.

Hypothesis 2a. Transactional leadership behavior is negatively related to the leader's Behavioral Intent to implement Lean.

Hypothesis 2b. Transactional leadership behavior is negatively related to the leader's favorable attitudes toward implementing Lean practices.

Hypothesis 2c. Transactional leadership behavior is negatively related to the leader's favorable subjective norms toward implementing Lean Enterprise.

Hypothesis 2d. Transactional leadership behavior is positively related to the leader's favorable perceived behavioral control over implementing Lean Enterprise.

Leader-Member Exchange Relationship

The Leader-Member Exchange (LMX) relationship embraces qualities from both transactional and transformational leaderships (Howell & Hall-Merenda, 1999). There are two levels of LMX quality—low and high (Howell & Hall-Merenda, 1999). The low level is most comparable to transactional leadership (Howell & Hall-Merenda, 1999), as it is based strictly on employment contracts (Liden & Maslyn, 1998), i.e., motivation by reward. The high-quality level is characterized by transformational leader attributes. At the high level, the leader-follower relationship is founded on mutual trust, respect, liking and reciprocal influence (Liden & Maslyn, 1998). This results in a motivation for followers to go the extra mile towards the organization's collective goals (Gerstner & Day, 1997; Graen & Uhl-Bien, 1995). LMX measures the follower's perceived affect, loyalty, contribution, and professional respect towards leaders (Liden & Maslyn, 1998). At low quality, affect, loyalty, contribution, and professional respect are low. As we move up the scale towards high quality these variables start to increase. Further, LMX relationship has control over change as it seeks to generate more effective leadership performance through the maturing of leadership relationships (Graen & Uhl-Bien, 1991).

This is done by moving up the scale towards high quality and, thus, high follower affect, loyalty, contribution, and professional respect.

Hypothesis 3a. A high-quality LMX leadership behavior is positively related to the leader's Behavioral intent to implement Lean.

Hypothesis 3b. A high-quality LMX leadership behavior is positively related to the leader's favorable attitude implementing Lean practices.

Hypothesis 3c. A high-quality LMX leadership behavior is positively related to the leader's favorable subjective norms toward implementing Lean Enterprise.

Hypothesis 3d. A high-quality LMX leadership behavior is positively related to the leader's favorable perceived behavioral control over implementing Lean Enterprise.

3.3. Leadership and Lean Enterprise

Leaders drive transformation within organizations from what is to what they think should be (Wheelen et al., 2014). It is important that in the process of improvement the leader is attentive to the cultural conservativeness (Bass & Avolio, 1992), with the intention of staying faithful to the organizational vision. It is inevitable for leaders to make modifications to achieve newly formulated goals (Bass & Avolio, 1992). To successfully implement changes, the necessary activities are strategic thinking, culture building, and teamwork (Schaubroeck et al., 2007). On the other hand, a Lean Enterprise transformation has its own set of requirements. These requirements can be broken down into three cycles (Nightingale & Mize, 2002). The first is the *Entry/Re-entry Cycle*

(Nightingale & Mize, 2002), where leaders must decide to adopt Lean thinking. Followed by the *Long-Term Cycle,* where leaders must prepare the environment and conditions for a successful transformation (Nightingale & Mize, 2002). In the next cycle, or the *Short-Term Cycle*, implementation is planned, executed, and monitored (Nightingale & Mize, 2002). Finally, the leader must once again prepare the process for further improvement.

As indicated by the Lean Enterprise Model, leadership is important in every Lean practice (Nightingale & Mize, 2002). First, the leader must desire to implement Lean practices. Desiring improvement is one of the qualities that makes transformational leaders transformational as they are willing to take risks by encouraging followers to be innovative (Barbuto & Cummins-Brown, 2007). Their strategic thinking lays in that teamwork starts by planting a seed of importance within the individuals of the team (Schaubroeck et al., 2007). This allows team members to feel essential and responsible for collaborating towards achieving organizational goals (Givens, 2008). To further transform into Lean Enterprise, leaders must prepare the organizational environment (Nightingale & Mize, 2002). Transformational leaders do this by building the culture (Bass & Avolio, 1992; Givens, 2008; Schein, 1985, 1995). It is important to start here because the culture is the "glue that holds the organization together" (Tichy, 1982, p. 63). The culture influences the beliefs, values, and norms of the organization (Bass & Avolio, 1993; Schein, 1985; Trice & Beyer, 1993), and thus the followers. Therefore, transformational leaders start by understanding the culture to then implement the target change (Bass & Avolio, 1992).

Understanding the culture is key because it provides the necessary knowledge leaders need to inspire motivation (Howell & Hall-Merenda, 1999). Transformational leaders combine this knowledge with creating a strong sense of purpose in followers and clarifying future goals (Barbuto & Cummins-Brown, 2007) to move to the short-term cycle. This is where, finally, the leaders walk-the-walk, as in do what they have prepared to do. Transformational leaders are ideal to implement Lean because with their commitment (Bass, Waldman, Avolio, & Bebb, 1987; Waddock & Post, 1991) they can influence organizational outcomes (Barling, Weber, & Kelloway, 1996; Koh, Steers, & Terborg, 1995; Lowe & Kroeck, 1996; Howell & Hall-Merenda, 1999). There is a high chance of successful Lean implementation in a transformational culture because the leaders demonstrate an inclusive vision, are committed and persistent, and develop trust among employees (Barbuto & Cummins-Brown, 2007). Not only that but rather than focusing on a portion of the matter at hand, transformational leaders analyze and understand the broader scope (Bass & Avolio, 1992). Looking at the big picture, they solve problems by identifying the interconnecting relationships that exist between the organizational areas/departments. This is important because Lean implementation requires team collaboration (Givens, 2008).

Hypothesis 4: Transformational leadership is positively associated to a successful implementation of Lean Enterprise.

Unlike transformational leaders, transactional leaders are not as quick to decide to go Lean, because it means moving away from the status quo (Howell & Hall-Merenda,

1999). Transactional leaders seek comfort in conservative ways (Barbuto & Cummins-Brown, 2007), thus, they do not go out of their way to change cultures (Howell & Hall-Merenda, 1999). Also, commitment is short-lived in a transactional culture (Howell & Hall-Merenda, 1999). This is because leaders discourage follower's creativity by stressing flaws and basing relationships on contractual rewards (Barbuto & Cummins-Brown, 2007; Howell & Hall-Merenda, 1999). Lean implementation success is possible under a contingent rewards type of leadership. However, without a transformational structure followers lack motivation past price value (Bass, 1985; Breevaart et al., 2014; Dunegan et al.,1992), creating a limit to their motivation and efforts. This constraint makes committing to continuous improvement difficult (Breevaart et al., 2014).

Hypothesis 5: Transactional leadership is weakly correlated to a successful implementation of Lean Enterprise.

LMX measures the relationship between leaders and followers. Its variables can identify the type of leadership in place as either pure transformational or transactional or a combination of the two (Graen & Uhl-Bien, 1995). The LMX measuring scale has two extremes—low quality and high quality (Graen & Uhl-Bien, 1995). At low quality, LMX reflects transactional leadership (Liden & Maslyn, 1998). However, Nightingale and Mize (2002) found that achieving lasting results requires leaders who personally championed Lean practices. This is something that transactional leaders, having no inspirational appeal, lack (Breevaart et al., 2014). A high-quality Leader-Member Exchange relationship has attributes that are most comparable to transformational

leadership (Howell & Hall-Merenda, 1999). Thus, the closer to high-quality the relationship is, the more effective organizational performance (Howell & Hall-Merenda, 1999). Hence, high-quality LMX will have similar results as transformational leadership.

Hypothesis 6: High-quality LMX is positively associated to a successful implementation of Lean Enterprise.

3.4. Lean Enterprise and the Theory of Planned Behavior

TPB measures the variables prompting an individual to enact a particular behavior (Conner & Armitage, 1998). To be measured by TPB, the behavior must be perceived as either favorable or unfavorable under intentions, attitudes, SNs, and PBC (Ajzen, 1991). This study's target behavior is to utilize Lean Enterprise to innovate, improve and maintain organizational performance.

Intention suggests that the individual's actual behavioral performance must be influenced by either motivation or discouragement (Conner & Armitage, 1998). The evidence below demonstrates the probability of an increase or decrease in intention. They work to prove that the behavior of utilizing Lean Enterprise satisfies the requirements of TPB.

Some authors disapprove of Lean because they reason that it largely about oppressing workers (Delbridge 1995, 1998; Delbridge, Turnbull, & Wilkinson, 1992; Sewell & Wilkinson, 1992; Wilkinson & Oliver, 1989) and Delbridge (1995, 1998) further argues that Lean leads to a highly stressful working environment These are unfavorable philosophies that affect attitudes and SNs. Attitude towards behavior

suggests that target behavior must allow for an evaluation of *harmful* or *beneficial,* and *enjoyable* or *unenjoyable* (Ajzen, 2002). Also, SN requires the existence of social pressure to either perform or not perform the desired behavior (Francis et al., 2004). Thinking that Lean will lead to stress and oppression can create unfavorable attitudes and SNs, thus, decreasing intentions. Individuals can achieve favorable attitudes and SNs when they and their peers are knowledgeable of Lean's success in increasing organizational performance and competitive advantage (Bhati and Drew, 2006; Graban, 2014; Krafcik, 1988; MacDuffie, 1995; Ōhno,1988; Pil and MacDuffie, 1996; Womack et. al., 1990). Hence, Lean Enterprise satisfies the requirement of attitude and subjective norms.

The target behavior must summon confidence, or lack thereof, (Azjen, 1991) through the perceived levels of difficulty and control (Conner & Armitage, 1998). Having no control will prevent the individual from performing the target behavior (Conner & Armitage, 1998). Many authors suggest that Lean is not transferable outside of manufacturing (Cooney, 2002; Jorgensen, 2008; Nakamura, Sakakibara, & Schroeder, 1996; Pilkington, 1998). Thus, if an individual stumbles upon this information, their confidence levels can decrease as they begin to doubt their capability and control of utilizing Lean Enterprise. In turn, this can decrease intentions. On the other hand, we researchers and professors who praise Lean's adaptability and feasibility (Bruun & Mefford, 2004; Womack, Byrne, Fiume, Kaplan, & Toussaint, 2005; Womack & Jones, 1996). A leader who believes that they have control over utilizing Lean Enterprise can

become motivated, thus, increasing behavioral intentions. These favorable and unfavorable perspectives satisfy the requirements of PBC.

Evidently, utilizing Lean Enterprise satisfies the requirements of behaviors that can be measured by TPB. The Theory of Planned Behavior suggests that if intentions are held constant, the likelihood of performing the behavior increases as attitudes, SN and PBC, increase (Conner & Armitage, 1998). Holding intentions constant, Lean Enterprise is more likely to be implemented when TPB variables increase.

Hypothesis 7a: Intentions will be positively related to implementing Lean Enterprise.

Hypothesis 7b: Attitudes will be positively related to implementing Lean Enterprise.

Hypothesis 7c: Subjective norms will be positively related to implementing Lean Enterprise.

Hypothesis 7d: Perceived behavioral control will be positively related to implementing Lean Enterprise.

Figure 1 (page 27) depicts the relationships found in the hypotheses.

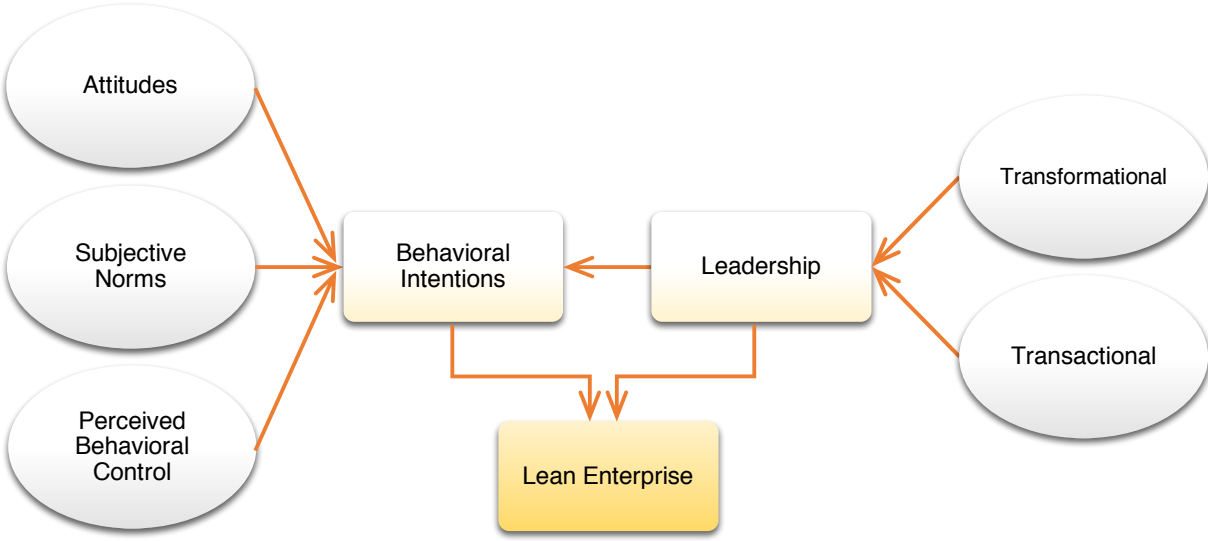

Figure 1. Proposed model – Impact of leadership on employing Lean Enterprise: The Influential roles of behavioral intentions.

4. Materials

For this study, we made used of the Theory of Panned Behavior, the Organizational Description Questionnaire, and Shah and Ward's (2007) Lean Measurement Questionnaire. The Leader-Member Exchange (LMX) measurement is used as supplementary support for the hypothesis. LMX supplies further information regarding the relationship between leaders and followers.

4.1. Theory of Planned Behavior (Francis et al.*, 2004)*

The Theory of Planned Behavior (TPB) was chosen to measure the behavioral intentions of leaders. The TPB manual (Francis et al., 2004) was put together based on Ajzen's (1988) TPB psychological research and model. As Francis, et al. (2004) explains, this manual is to assist researchers in predicting and understanding behavior. It provides advice from TPB literature to better supplement knowledge on writing a questionnaire that investigates attitudes and beliefs.

4.2. Organizational Description Questionnaire (Bass & Avolio, 1992)

The Organizational Description Questionnaire (ODQ) has been used as a method for organizations to understand the importance organizational culture (Bass & Avolio, 1992). This multi-step training for organizational leaders includes a questionnaire that differentiates a transactional culture from a transformational culture. It is assumed that transformational cultures are led by transformational leaders, and that transactional cultures by transactional leaders.

4.3. Shah and Ward's (2007) Lean Measure Questionnaire

While a sizeable amount of literature focused on becoming Leaner, Shah and Ward (2007) decided to research the leanness of an organization. Thus, they came up with a 41-item questionnaire that links key Lean measurements with components used in past literature.

4.4. Leader-Member Exchange (Liden & Maslyn, 1998)

This survey has been added as a complement to the ODQ, to better identify the leadership in existence. As explained in the literature review, the higher quality the LMX is, the more transformational the leadership likely is. Likewise, the lower quality the LMX is, the more likely is the leadership to be transactional. This four-construct LMX questionnaire has been adapted from Liden and Maslyn's (1998) leader-relationship research.

4.5. Qualtrics

Qualtrics is a private research software company that allows professionals of all fields to collect data online. This paperless system allows for a significant increase in participant's privacy and security. Further, through Qualtrics, we easily distributed an anonymous link to all potential participants. It also allowed us to restrict participants from continuing to the next question without the completion of 'current' question. Barnhoorn, Haasnoot, Bocanegra, & van Steenbergen (2015) touches on the ease and reliability of using the Qualtrics software. Qualtrics allowed us to simply type in all the questions, and with the simple click of a few buttons, we customized the questionnaire to our liking.

4.6. Gift Card Incentive

There is no direct compensation, however, as a token of our appreciation for completion of the survey, the participant will be entered into a drawing to win 1 of the 5 prizes. There is an optional section at the end of the online questionnaire where participants have the option of emailing us to enter. Those who chose to provide their email were entered to win one of five $25 gift cards. The e-gift cards are going to be emailed to winners.

5. Methodology

5.1. Sample and Procedures

Participants represent a demographic of managers and leaders who have been in their position for 1 or more years. APICS[1] is assisting in the distribution of the questionnaire. They are a leading professional society for leaders in the supply chain industry. Via email, the study has been distributed to 724 members of the APICS Northeast and South Carolina and Buffalo community. Out of these 724 individuals, 102 have opened the email and 77 have completed the questionnaire. Some common email responses that were received came from automatic messages stating that the address owner was either on vacation or no longer working in the company. The first page of the questionnaire includes the consent document that states that participation is strictly voluntary and responses are completely anonymous. Qualtrics created an anonymous link to the online questionnaire that is attached to the recruiting letter sent by APICS. This

[1] APICS is a professional association of Supply Chain Management that provides research concerning supply chain excellence, innovation and resilience. One of their many interests lays in the transforming organizational systems into Lean Innovators. Because of this interest and because it advances supply chains, APICS has supported this investigation.

link allows participants to complete the questionnaire electronically. No paper and pencil questionnaire were collected or distributed.

Once a participant has connected to the questionnaire they may proceed to start the survey. The questionnaire comprised 108 questions that have taken past participants an average of 20 minutes to complete. Once the individual starts the online questionnaire, no question can be skipped before moving on to the next. Qualtrics automatically saves responses, thus, if a participant is unable to finish, they can exit and later re-enter the questionnaire. The survey items are independent of one another, in the sense that the response to any one question is not dependent on a previous question/answer. Lastly, Qualtrics allows participants to complete the questionnaire one time only, with absolutely no retakes permitted. After completion of the questionnaire, the link will always lead web browser to a thank you page. Hereafter, any time a participant clicks on the survey link, he/she will be redirected to the thank you page. This feature will prevent ballot box stuffing. Qualtrics automatically separates into two sections the questionnaires that are completed versus those that are partially complete. Qualtrics expires partially completed questionnaire within seven days.

5.2. Measures

TPB, ODQ, Leanness measure and LMX comprised various subconstructs. This study's primary measurements and their variables are portrayed in Figure 2. LMX variables are depicted in Figure 3. To develop the behavioral questionnaire, TPB items were adapted to fit with a Leadership-Lean environment. ODQ, Lean survey, and LMX

were kept in their original state, as they matched perfectly with the demand of the study. The questionnaire developed for the study is found in appendix A.

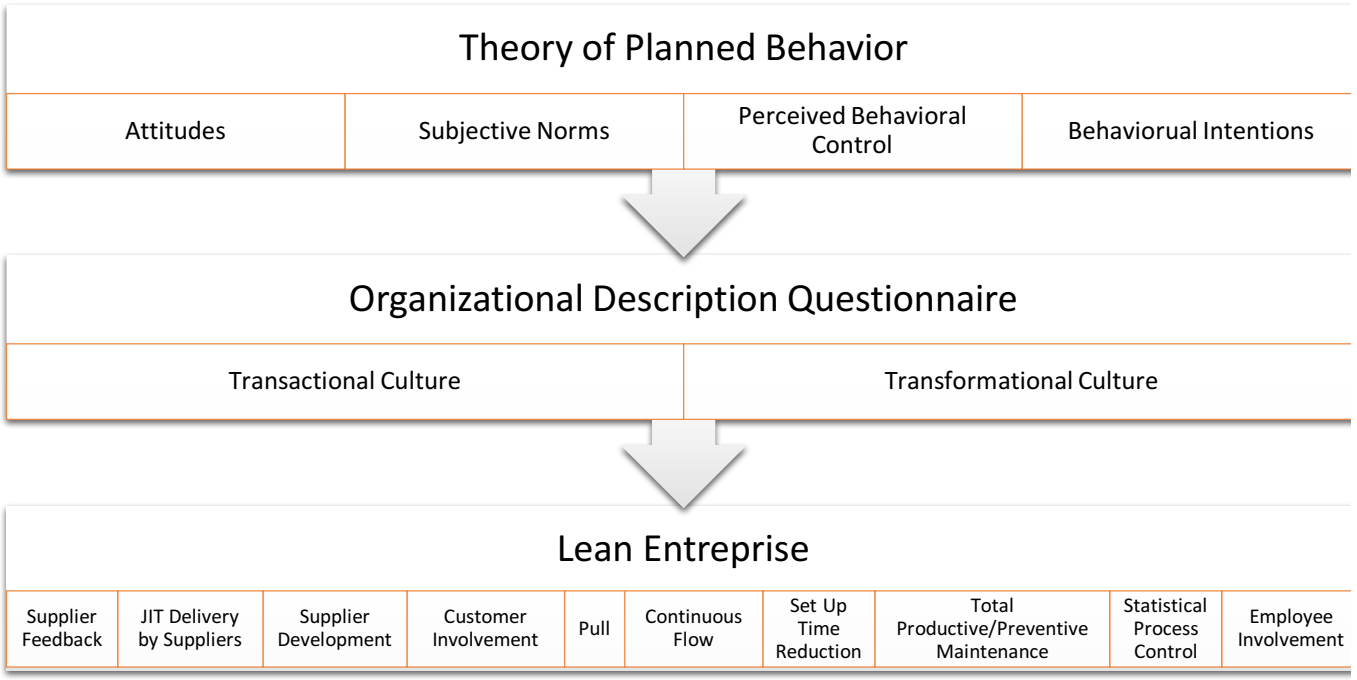

Figure 2. The TPB, ODQ, & Lean variables measured in this study

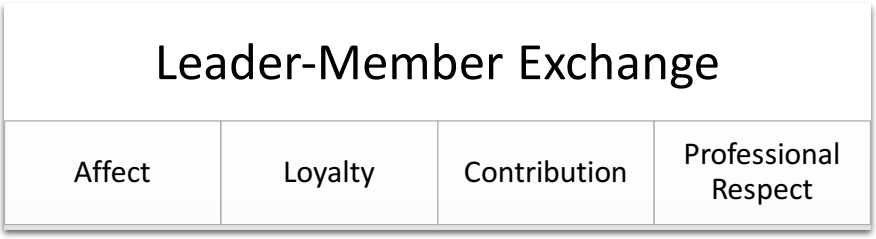

Figure 3. The LMX variables measured in this study.

5.2.1. Background: Qualification for Study

APICS serves professionals of all levels in the business world. Thus, it is necessary to filter out members who are not in a direct leadership position. This screening

process is required because this study is focused on the relationship between leadership and Lean Enterprise. Leadership being defined as the authoritative figure in an organization who can shape cultures and inspire and motive followers to achieve goals.

This section is measured by three items. The first one is identifying a participant's role in their organization. For this first item, there are three options—*manager, leader,* and *other*. Other allows the participant to insert their role. The second item questions the length of time, in years, that they have held their current position. This is broken down into four choices—*1 to 3 years, 4 to 6 years, 7 to 9 years,* and *10-plus years*. If *10-plus years,* the participant will identify the specific length in the box provided. The last screening item questions the number of followers directly under the participant's leadership. Choices are—I do not have employees (E) under my leadership, 1 to 5 E, 6 to 10 E, 11 to 20 E, 21 to 50 E, and more than 50 E. If more than 50 participants are not given the option to identify the specific number.

5.2.2. The Theory of Planned Behavior

Four items are applied to measure leadership behavior—intentions, attitudes, subjective norms, and perceived behavioral control. Each variable, independently, is composed of six items.

Behavioral Intention

Following the TPB manual's (Francis et al., 2004) instructions, intentions are measured on a scale of 1 to 5. Where 1 is *strongly disagree*, 2 is *disagree*, 3 is *neither agree nor disagree*, 4 is *agree*, and 5 is *strongly agree*.

For purposes of this study, we will utilize behavioral intention method 2 (generalized intention) to measure intentions (Francis et al., 2004). Scoring is done by calculating the mean of the three intention scores. For example, respectively from items 1 to 6, a participant whose scores are 3, 4, 2, 5, 4, 1, will result in a Mean Score of 3.17.

Attitudes & Subjective Norms& Perceived Behavioral Control

Following the TPB manual's (Francis et al., 2004) instructions, attitudes, SN, and PBC are measured on a scale of 1 to 5. Where 1 is *strongly disagree*, 2 is *disagree*, 3 is *neither agree nor disagree*, 4 is *agree*, and 5 is *strongly agree*.

The formula used for scoring is X= (1x2) + (3x4) + (5x6). Where X is the variable attitudes, SN, or PBC, independently. Where digits 1 to 6 represent the question(Q) number. For example, SN= (Q1xQ2) + (Q3xQ4) + (Q5xQ6).

5.2.3. Organizational Description Questionnaire

Twenty- eight items, adapted from Bass & Avolio's (1992) ODQ manual, are applied to measure leadership styles—transactional and transformational. The odd items represent transactional leadership. Further, the even items represent transformational leadership. For items 1 through 28, participants are asked to choose "T" for a true statement, "F" for a false statement, or ? if undecided or unknowledgeable.

In their manual, Bass and Avolio (1992) include a guide on how to score the ODQ. The transactional score is obtained by subtracting the count of the odd values that are false from the odd values that are true. Likewise, subtract the count of the even values that are false from the even values that are true to get the transformational leadership score.

5.2.4. Leanness

Forty-one items measured the levels of leanness of the organization in question. Shah and Ward (2007) used these exact items in their research of defining and measuring Lean. There are 10 variables being used to measure leanness: *Supplier Feedback* (items 56-58), *JIT Delivery by Suppliers* (59-61), *Supplier Development* (62-67), *Customer Involvement (*68-72), *Pull* (73-76), *Continuous Flow* (77-80), *Set-Up Time Reduction* (81-83), *Statistical Process Control* (84-88), *Employee Involvement* (89-92), and *Total Productive/Preventive Maintenance* (93-96).

Participants are asked to indicate the extent of implementation of each of the practices (items) in their organization: (1) no implementation; (2) little implementation; (3) some implementation; (4) extensive implementation; (5) complete implementation. Each item has a pre-identified score (appendix B) (Shah and Ward, 2007).

5.2.5. Leader-Member Exchange

Twelve items are applied to measure LMX levels. These twelve items were broken down into groups of three per subconstruct. The subconstructs are *affect* (items 97-99), *loyalty* (100-102), *contribution* (103-105), and *professional respect* (106-108). Following Liden and Maslyn's (1998) instructions, items are presented on a scale of 1 to 5. Where 1 is *strongly disagree*, 2 is *disagree*, 3 is *neither agree nor disagree*, 4 is *agree*, and 5 is *strongly agree*.

6. Future Direction

Looking ahead—over the next three months—this conceptual piece can yield tenable results. I hope and expect to reach 120-plus responses. Further, I realize now that studying only APICS members will limit my results, as must members are in either supply chain or operations. In the future, I will get in contact with other organizations, like the Lean Enterprise Institute, to expand my study results outside of manufacturing. Also, APICS Providence is currently working towards distributing my questionnaire to APICS National. Both opportunities, APICS National and venturing outside of supply chain, will increase the diversity among participants and increase result's validity and reliability.

Future research can expand more on Lean Measures. Throughout my investigations, I stumbled upon other measures of Lean, both qualitative and quantitative. Future studies of leadership and Lean can increase correlation validity by using more process focus Leanness measures. The Lean measure used in this study is focused on manufacturing, making survey items difficult to apply to other industries. A sizable amount of these measures is addressed by Stone (2012) in his article *Four Decades of Lean: a systematic literature review*. Further, the Lean measure used in this study has been tested by Shah and Ward (2007) and resulted in an acceptable reliability and validity. The ten process variables are approximate measures of a business' Leanness. However, I believe that it does not allow the flexibility of easily applying the concepts in industries outside of manufacturing.

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8. Appendix A: Questionnaire Used in Study

Table of Contents

CONSENT DOCUMENT
Rhode Island College

LEADERSHIP AND THE SOCIAL PSYCHOLOGY OF LEAN ENTERPRISE

You are being asked to be in a research study about how effectively lean enterprise is implemented in your company. You are being asked because of your role as a member of APICS. Please read this form and ask any questions that you have before choosing whether to be in the study.

Paul Jacques, a professor at Rhode Island College, and Lissa Almanzar, an undergraduate student of management, are doing this study.

Why this Study is Being Done (Purpose)

We are doing this study to learn about the various factors that might affect the lean outcomes of a company. We are also looking at your perception of the leadership style present in your organization.

What You Will Have to Do (Procedures)

If you choose to be in the study, we will ask you to:

- Read and answer some survey questions. The questions ask basic things about yourself and your employer like your position, your knowledge of lean enterprise, the influence you might have on your company's decision making, the forces that influence decisions you make in your position, and other questions. This will take about 20 minutes.
    - Without spending too much time dwelling on any one item, consider your response to the questions as described in the section. Please respond to this survey as honestly as possible. Mark the response that best shows how you really feel or see yourself, not responses that you think might be desirable or ideal.

Incentives

There are no direct benefits for completing this study. Thus, as a way to thank you for your time,
you will:

- be entered in a drawing to win one of five $25 e-gift cards
    - Please note that in order to participate in the drawing you must provide your email or phone number to the researchers. This information will be

used only for purposes of the raffle and will not be linked to your responses on the survey

- receive aggregated stud results to assist with future decisions
- be invited to a webinar revealing study results

Risks or Discomforts

We believe that the questions posed in the study are similar to the kinds of things you talk about with co-workers, family, or friends. You can skip any questions you don't want to answer. If you want to talk to someone about your feelings or about problems that you're having, you can contact the Employee Assistance Program in your organization or a member of the company's Human Resources Department. We do not pay for any fees that you may incur as a result of processes you use to seek assistance.

Benefits of Being in the Study

Being in this study will not benefit you directly.

Deciding Whether to Be in the Study

Being in the study is your choice to make. Nobody can force you to be in the study. You can choose not to be in the study, and nobody will hold it against you. You can change your mind and quit the study at any time, and you do not have to give a reason. If you decide to quit later, nobody will hold it against you.

How Your Information will be Protected

Because this is a research study, results will be summarized across all participants and shared in reports that we publish and presentations that we give. Your name will not be used in any reports. We will take several steps to protect the information you give us so that you cannot be identified. Instead of using your name, your information will be given a code number. The information will be kept within the Qualtrix software, and seen only by Dr. Jacques, Rhode Island College professor, and the student researcher, Lissa Almanzar. The only time we would have to share information from the study is if it is subpoenaed by a court, or if you are suspected of harming yourself or others, then we would have to report it to the appropriate authorities. Also, if there are problems with the study, the records may be viewed by the Rhode Island College review board responsible for protecting the rights and safety of people who participate in research. The information will be kept for a minimum of three years after the study is over, after which it will be destroyed.

Who to Contact

You can ask any questions you have by contacting Dr. Jacques at 828-399-1839, or via email at pjacques@ric.edu, or Lissa Almanzar via email at lalmanzar_3732@email.ric.edu.

If you think you were treated badly in this study, have complaints, or would like to talk to someone other than the researcher about your rights or safety as a research participant, please contact Cindy Padula at IRB@ric.edu, by phone at 401-456-9720.

Statement of Consent

I have read and understand the information above. I am choosing to be in the study "Relationship Between Transformational Leadership & Lean Performance". I can change my mind and quit at any time, and I don't have to give a reason. I have been given answers to the questions I asked, or I will contact the researcher with any questions that come up later. I am at least 18 years of age.

By proceeding with the process and responding to these questionnaire items, you are expressing your understanding of these terms and your consent for your data to be used for research purposes. You are also agreeing to release and forever discharge Rhode Island College, APICS, Paul H. Jacques, and Lissa Almanzar from any and all claims of any kind or nature whatsoever arising from the assessment process.

Optional Fields

If you wish to participate in the $25.00 Amazon e-gift card drawing, please email Dr. Jacques at pjacques@ric.edu or Lissa Almanzar at lalmanzar_3732@email.ric.edu and provide your phone number and email address so that you may be entered into the raffle and notified if you win one of the e-gift cards.

To advance to the study, click here

Questionnaire

Background

1. Which of the following, best describes your position? (choose the best one)

   If other, please specify in the box provided

   ○ Manager

   ○ Team Leader

   ○ Other

2. How long have you been in your current leadership position?

   If more than 10 years, specify in the box provided.

   ○ 1-3 years

   ○ 4-6 years

   ○ 7-9 years

   ○ 10+ years

3. What is the number of employees under your direct leadership?

   If more than 50, specify in the box provided.

   ○ I don't have employees under my leadership

   ○ 1-5 employees

   ○ 6-10 employees

   ○ 11-20 employees

   ○ 21-50 employees

   ○ More than 50

Theory of Planned Behavior

Antecedents to operations managers' intent to engage in lean enterprise. Given that managers are given discretion in directing energy/resources beyond that which is mandated….

Sample Items for the Theory of Planned Behavior (Ajzen, 1988, 1991; Francis et al***., 2004)***

Attitudes to discretionary behaviors

4. Using my influence to implement lean enterprise would be advantageous to the company.

   Strongly Disagree 1 2 3 4 5 Strongly Agree

5. Giving me discretion in doing my job is important to this company.

   Strongly Disagree1 2 3 4 5 Strongly Agree

6. I prefer to be told what to do when implementing lean enterprise.

   Strongly Disagree1 2 3 4 5 Strongly Agree

7. My performance is better when I follow specific instructions on how to do my job.

   Strongly Disagree1 2 3 4 5 Strongly Agree

8. I would be comfortable being given freedom to choose how to implement lean enterprise.

   Strongly Disagree1 2 3 4 5 Strongly Agree

9. Having autonomy in my job produces better outcomes.

   Strongly Disagree1 2 3 4 5 Strongly Agree

Subjective Norms (immediate superiors, peers, immediate subordinates)

10. My immediate supervisor thinks that I should use my discretion while implementing lean enterprise.

    Strongly Disagree1 2 3 4 5 Strongly Agree

11. What my immediate supervisor thinks about how I do my job is important to me.

    Strongly Disagree1 2 3 4 5 Strongly Agree

12. People at my level in the company think that I should use my discretion while implementing lean enterprise.

Strongly Disagree1 2 3 4 5 Strongly Agree

13. My peers think that how I do my job is important to me.

Strongly Disagree1 2 3 4 5 Strongly Agree

14. What my immediate subordinates think about how I implement lean enterprise matters little to me. (r)

Strongly Disagree1 2 3 4 5 Strongly Agree

15. It matters to me what my immediate subordinates think about how I manage.

Strongly Disagree1 2 3 4 5 Strongly Agree

Perceived Behavioral Control (the degree to which subjects have control)

16. I have been given leeway to determine whether to implement lean enterprise.

Strongly Disagree1 2 3 4 5 Strongly Agree

17. I am normally left alone to manage how I see fit.

Strongly Disagree1 2 3 4 5 Strongly Agree

18. I have permission to implement lean enterprise.

Strongly Disagree1 2 3 4 5 Strongly Agree

19. My superiors approve my actions without question.

Strongly Disagree1 2 3 4 5 Strongly Agree

20. My company has too many barriers to implement lean enterprise. (r)

Strongly Disagree1 2 3 4 5 Strongly Agree

21. Overcoming obstacles in my company is difficult.

Strongly Disagree1 2 3 4 5 Strongly Agree

Behavior Intention (discretionary lean enterprise behaviors)

22. I expect to implement lean practices to the activities performed by my organization.

Strongly Disagree1 2 3 4 5 Strongly Agree

23. I intend to implement lean enterprise.

Strongly Disagree1 2 3 4 5 Strongly Agree

24. In the near future, I intend to keep organizational activities unchanged.

Strongly Disagree1 2 3 4 5 Strongly Agree

25. I will implement lean enterprise.

Strongly Disagree1 2 3 4 5 Strongly Agree

26. I desire to implement lean enterprise.

Strongly Disagree1 2 3 4 5 Strongly Agree

27. I intend to avoid implementing lean enterprise.

Strongly Disagree1 2 3 4 5 Strongly Agree

Organizational Description Questionnaire

Organizational Description Questionnaire (B. Bass and B. Avolio, 1992)

INSTRUCTIONS For items 1 through 28, choose "T" for a true statement, "F" for a false statement, or "?" if you are undecided or cannot say about the team, department, or organization you are leading or representing.

IN MY TEAM, DEPARTMENT OR ORGANIZATION…

28. We negotiate with each other for resources.

T F ? ?

29. People go out of their way for the good of the team, department and/or organization.

T F ? ?

30. Decisions are often based on precedents.

T F ? ?

31. There is continuous search for ways to improve operations.

T F ? ?

32. Rules and procedures limit discretionary behavior.

T F ? ?

33. Mistakes are treated as learning opportunities.

T F ? ?

34. You get what you earn — no more, no less.

T F ? ?

35. When you are unsure about what to do, you can get a lot of help from others.

T F ? ?

36. There is strong resistance to changing the old ways of doing things.

T F ? ?

37. We trust each other to do what's right.

T F ? ?

38. It's hard to find key people when you need them most.

T F ? ?

39. We are encouraged to consider tomorrow's possibilities.

T F ? ?

40. Bypassing channels is not permitted.

T F ? ?

41. New ideas are greeted with enthusiasm.

T F ?

42. One or two mistakes can harm your career.

T F ?

43. Individual initiative is encouraged.

T F ?

44. Decisions often require several levels of authorization before action can be taken.

T F ?

45. We strive to be the best in whatever we do.

T F ?

46. Agreements are specified in advance on what each of us must do to complete the work.

T F ?

47. Stories are shared of the challenges that we have overcome.

T F ?

48. People are hesitant to say what they really think.

T F ?

49. The unwritten rule is to admit mistakes, learn from them, and move on.

T **F** **?**

50. We have to compete with each other to acquire resources.

T **F** **?**

51. You advance or achieve depending on your initiative and ability.

T **F** **?**

52. Deviating from standard operating procedures without authorization can get you into trouble.

T **F** **?**

53. We share the common goal of working toward the team, department and/or organization's success.

T **F** **?**

54. People often try to avoid responsibility for their actions.

T **F** **?**

55. We encourage a strong feeling of belonging.

T **F** **?**

Measures of Lean Enterprise

Defining and Developing Measures of Lean Production (R. Shah and P. Ward, 2007)

Please indicate the extent of implementation of each of the following practices in your plant. (1) no implementation; (2) little implementation; (3) some implementation; (4) extensive implementation; (5) complete implementation.

56. We frequently are in close contact with our suppliers

57. We give our suppliers feedback on quality and delivery performance

58. We strive to establish long-term relationship with our suppliers

59. Suppliers are directly involved in the new product development process

60. Our key suppliers deliver to plant on JIT basis

61. We have a formal supplier certification program
62. Our suppliers are contractually committed to annual cost reductions
63. Our key suppliers are located in close proximity to our plants
64. We have corporate level communication on important issues with key suppliers
65. We take active steps to reduce the number of suppliers in each category
66. Our key suppliers manage our inventory
67. We evaluate suppliers on the basis of total cost and not per unit price
68. We frequently are in close contact with our customers
69. Our customers give us feedback on quality and delivery performance
70. Our customers are actively involved in current and future product offerings
71. Our customers are directly involved in current and future product offerings
72. Our customers frequently share current and future demand information with marketing department
73. Production is "pulled" by the shipment of finished goods
74. Production at stations is-pulled" by the current demand of the next station
75. We use a "pull" production system
76. We use Kanban. squares, or containers of signals for production control
77. Products are classified into groups with similar processing requirements
78. Products are classified into groups with similar routing requirements
79. Equipment is grouped to produce a continuous flow of families of products
80. Families of products determine our factory layout
81. Our employees practice setups to reduce the time required

82. We are working to lower setup times in our plant
83. We have low set up times of equipment in our plant
84. Large number of equipment /processes on shop floor are currently under SPC
85. Extensive use of statistical techniques to reduce process variance
86. Charts showing defect rates are used as tools on the shop-floor
87. We use fishbone type diagrams to identify causes of quality problems
88. We conduct process capability studies before product launch
89. Shop-floor employees are key to problem solving teams
90. Shop-floor employees drive suggestion programs
91. Shop-floor employees lead product/process improvement efforts
92. Shop-floor employees undergo cross functional training
93. We dedicate a portion of everyday to planned equipment maintenance related activities
94. We maintain all our equipment regularly
95. We maintain excellent records of all equipment maintenance related activities
96. We post equipment maintenance records on shop floor for active sharing with employees

Leader Member Exchange

Affect

97. I like my leader/supervisor/guide very much as a person.
Strongly Disagree 1 2 3 4 5 Strongly Agree

98. My supervisor is a lot of fun to work with.
Strongly Disagree 1 2 3 4 5 Strongly Agree

99. My supervisor is the kind of person one would like to have as a friend
Strongly Disagree 1 2 3 4 5 Strongly Agree

Loyalty

100. My leader/supervisor/guide defends my work actions to a superior, even without complete knowledge of the issue in question
Strongly Disagree 1 2 3 4 5 Strongly Agree

101. My leader/supervisor/guide would come to my defence if I were "attacked" by others
Strongly Disagree 1 2 3 4 5 Strongly Agree

102. My leader/supervisor/guide would defend me to others in the organization/department, if I made an honest mistake
Strongly Disagree 1 2 3 4 5 Strongly Agree

Contribution

103. I do not mind working my hardest for my supervisor.
Strongly Disagree 1 2 3 4 5 Strongly Agree

104. I do work for my supervisor that goes beyond what is specified in my job description.
Strongly Disagree 1 2 3 4 5 Strongly Agree

105. I am willing to apply extra efforts, beyond those normally required, to meet my supervisor's work goals.
Strongly Disagree 1 2 3 4 5 Strongly Agree

Professional respect

106. I admire my supervisor’s professional skills.
Strongly Disagree 1 2 3 4 5 Strongly Agree

107. I am impressed with my supervisor’s knowledge of his/her job.
Strongly Disagree 1 2 3 4 5 Strongly Agree

108. I respect my supervisor’s knowledge of and competence on job.
Strongly Disagree 1 2 3 4 5 Strongly Agree

END OF SURVEY

Thank you
for participating

9. Appendix B: Lean Items' Pre-Identified Scores

LEAN MEASURES

Item no.	Item label	Final CITC score
Suppfeed_01	We frequently are in close contact with our suppliers	0.40
Suppfeed_04	We give our suppliers feedback on quality and delivery performance	0.54
Suppfeed_05	We strive to establish long-term relationship with our suppliers	0.45
SuppJIT_01	Suppliers are directly involved in the new product development process	0.48
SuppJIT_02	Our key suppliers deliver to plant on JIT basis	0.48
SuppJIT_03	We have a formal supplier certification program	0.45
Suppdevt_01	Our suppliers are contractually committed to annual cost reductions	0.51
Suppdevt_02	Our key suppliers are located in close proximity to our plants	0.52
Suppdevt_03	We have corporate level communication on important issues with key suppliers	0.41
Suppdevt_04	We take active steps to reduce the number of suppliers in each category	0.54
Suppdevt_05	Our key suppliers manage our inventory	0.40
Suppdevt_06	We evaluate suppliers on the basis of total cost and not per unit price	0.47

Custinv_01	We frequently are in close contact with our customers	0.40
Custinv_03	Our customers give us feedback on quality and delivery performance	0.48
Custinv_04	Our customers are actively involved in current and future product offerings	0.42
Custinv_05	Our customers are directly involved in current and future product offerings	0.43
Custinv_06	Our customers frequently share current and future demand information with marketing department	0.42
Pull_01	Production is "pulled" by the shipment of finished goods	0.47
Pull_02	Production at stations is-pulled" by the current demand of the next station	0.50
Pull_03	We use a "pull" production system	0.54
Pul1_04	We use Kanban. squares, or containers of signals for production control	0.43
Flow_01	Products are classified into groups with similar processing requirements	0.44
Flow_02	Products are classified into groups with similar routing requirements	0.45
Flow_03	Equipment is grouped to produce a continuous flow of families of products	0.53
Flow_04	Families of products determine our factory layout	0.48
Setup_01	Our employees practice setups to reduce the time required	0.59
Setup_02	We are working to lower setup times in our plant	0.45
Setup_03	We have low set up times of equipment in our plant	0.49
SPC_01	Large number of equipment / processes on shop floor are currently under SPC	0.48

SPC_02	Extensive use of statistical techniques to reduce process variance	0.52
SPC_03	Charts showing defect rates are used as tools on the shop-floor	0.59
SPC_04	We use fishbone type diagrams to identify causes of quality problems	0.52
SPC_05	We conduct process capability studies before product launch	0.61
Empinv_01	Shop-floor employees are key to problem solving teams	0.57
Empinv_02	Shop-floor employees drive suggestion programs	0.50
Empinv_03	Shop-floor employees lead product/process improvement efforts	0.58
Empinv_04	Shop-floor employees undergo cross functional training	0.62
TPM_01	We dedicate a portion of everyday to planned equipment maintenance related activities	0.42
TPM_02	We maintain all our equipment regularly	0.44
TPM_03	We maintain excellent records of all equipment maintenance related activities	0.47
TPM_04	We post equipment maintenance records on shop floor for active sharing with employees	0.42