

SUPPLY CHAIN COSTS, QUALITY, AND PERFORMANCE: AN EXAMINATION OF TRANSFORMATIONAL LEADERSHIP TRAITS

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CASE DESCRIPTION

Leadership traits often are explored in terms of various company outcomes. Transformational leadership styles were investigated to determine associations of leadership style and supply chain management performance. Individual consideration is one of the five transformational leadership styles included in transformational leadership theory. A survey of supply chain professionals revealed supply chain performance improves when leaders in charge of supply chains exhibit individual consideration. The Multi-Leadership-Questionnaire (MLQ 5X) research instrument was combined with a validated supply performance questionnaire and administered to acquire information from supply chain professionals. The independent variables were supply chain leadership styles, and the dependent variable was supply chain performance, measured by aggregating several performance variables. The research results provided a “profile” of character traits correlated to improved performance. CEOs and hiring managers can utilize the data presented in the study to align supply chain leader candidates to appropriate positions based on leadership style and desired performance results. Stepwise regression resulted in one significant model. Leaders scoring high on Bass’s MLQ 5X sub-category in individual consideration obtained 17% better performance.

Keywords: Supply Chain, Leadership, Cost, Quality, Customer Service.

INTRODUCTION

DHL Corporation reported that finding the right combination of leadership and analytical skills of potential employee candidates is a problem. DHL was selected to include in this discussion because they are the third largest provider in the supply chain logistics market and their concerns reflect the industry in general. In a survey hosted by DHL, Fifty-eight percent of companies reported difficulty locating qualified candidates for chain management efforts. In the research brief, “*The Supply Chain Talent Shortage: From Gap To Crisis*,” authors reported there are misconceptions regarding the importance of strategic supply chains. Supply chain management is important because purchased materials (raw goods), account for a high percentage of total manufacturing companies’ cost of goods sold. Reducing costs of goods, increasing levels of quality, and increasing inventory turnover, benefit performance, contributing to increased profits, and increased revenue (Fawcett, 2008). Magnan & McCarter (2008) reported: managers should not overlook the value of employees in supply chains regarding creative ways to improve company procurement performance.

A lack of trust is common among companies in supply chains. Morash (1998) illustrated how organizations tend to operate in silos. Each department operates independently. The goals of one department sometimes conflict with the goals of other departments. Morash concluded that all department managers should be “*On the same page*.” Challenges for supply chain

management executives include integrating multiple organizations so that cross-functional teams perform with synergy. Morash elaborated with an illustration of inter-organizational collaborative structures combining various company organizations into one integrated supply chain. As an individual company, cross-functional organization management is challenging; applying leadership to multiple companies amplifies difficulties in leading people in different companies.

Supply chains led by charismatic leaders (transformational leaders) contribute to improved performance. Charismatic leaders improve inter-organizational cooperation and motivate employees. Improved cost, quality, and service contribute to company financial performance. The purpose of the study was to determine the degree one or more of the five transformational leadership styles contribute to supply chain performance. Chief Executive Officers can use the results of the study to "Screen" potential candidates for executive management positions overseeing supply chain management. The following sections discuss supply chain management literature, research methods, findings, and conclusions resulting from a study of supply chain professionals on various transformational leadership styles and supply chain performance.

The null hypothesis for the study (H_{10}) is there is no statistically significant relationship of between the five sub-categories of transformational leadership style and supply chain management performance. The alternate hypothesis (H_{1a}) is there is a relationship between one or more of the five sub-categories of leadership traits in The MLQ 5X survey instrument and employee performance.

Background Discussion

Supply Chain Management Performance

Supply chain management performance is challenging to measure. Naslund & Williamson (2010) reported the newness of matrix organizations and the recent development of integrated supply chains to contribute to difficulty measuring company performance. Differing criteria for measurement and terminology contribute to the dilemma. Deshpande (2012) determined large volumes of companies in various types of supply chains contribute to performance measurement difficulty.

Supply chain performance usually is measured on the individual, organizational metrics within separate departments. For example, it is common for quality departments to measure metrics, finance departments to measure pricing, and purchasing departments to measure on-time delivery. More recently, various forms of cross-functional teams have evolved and contributed to an integrated "Composite" type of assessment.

Opportunities for multiple organizations encompassing supply chain networks allow leaders to achieve improved value propositions and improved customer service. Competitive forces and ever-changing customer expectations contribute to reduced performance (Langley, et al., 2008). Competitive advantage is created in supply chains when supply chain managers leverage resources, as in applying Michael Porter's Five Forces Framework (Porter, 1985).

Supply chain management performance is often measured by assessing three variables: (a) product costs, measured by comparing actual prices paid over different periods; (b) delivery, measured by the degree on-time shipments improved or did not improve over time; (c) quality, the degree suppliers did or did not improve meeting specifications. Peterson et al. (2005) provided a method to trade off performance in cost reduction management and customer satisfaction.

Supplier quality performance is the degree products meet customer performance expectations (Langley et al., 2008). Bauld & McGuiness (2010) reported that specifications provide the standard for measuring product quality standards. Companies improved quality performance over the years, but embedding process techniques for sustained performance is challenging (Mwangola, 2018). Organizations improved supplier quality when integrating organizations responsible for designing, producing, and supplying customers' products. Sharing information on quality contributes to improved performance (Yu & Baofeng, 2018).

Customer service is determined by the degree companies deliver a product to customers within an agreed-upon tolerance to purchase order due dates. Supply chain organizations aim to meet customer delivery requirements. The Thai National Shippers' Council (2012) reported competition in the logistics sector requires forwarders to provide reliable and on-time deliveries. Monitoring systems provide feedback to supply chain managers. Customer service, including on-time delivery, improves customer loyalty. Governments and companies in supply chains strive to improve customer satisfaction over time (Narunart & Panjakajornsak, 2009).

Leadership style is essential for establishing organizational behavior and for achieving performance results (Bass, 1985). The current report examines the degree sub-components of the transformational leadership style contribute to improved supply chain performance in product quality and customer service.

Transformational Leadership Evolution

Tasks, roles, and social roles in problem-solving groups were popularized as far back as the 1950s (Bales, 1958). Bales advocated two types of leaders. First, leaders specialized in delegating tasks and creating activities of followers. Second, managers focused on maintaining good moral and cohesion among employees. Tannenbaum & Schmidt (1958) added to Bales by introducing leadership patterns based on selecting approaches considering leaders' values, work environment considerations, and abilities of employees. In the 1960s, Fiedler introduced contingency leadership. In contingency leadership, a "*Contract*" is developed between leaders and followers. The idea is to provide rewards based on results (Fiedler, 1967). In the 1970s, Burns introduced Transformational leadership theory (Burns, 1978). Burns introduced ideas such as establishing goals based on the personal needs of employees. The social "*Contract*" became a replacement for former manager/leader theories of the past. Goals are established in the Burns theory with consideration for the personal aspirations and situations of employees. According to Burns, traditional management emphasized task-oriented themes. Managers concerned themselves with managing transactions. Tasks were planned, organized, implemented, and controlled with the support of employees whose managers delegated responsibilities. Transformational leadership consisted of emphasis on the personal and professional needs of employees. Taking care of employees' needs was one of several ways leaders sought to improve overall performance.

Transformational leadership theory (Bass, 1985) became the accepted standard for describing and measuring leadership traits. Bass contributed by introducing a leadership assessment tool, the MLQ 5X, allowing assessment of leaders' style based on the theories developed from the 1950s to the 1980s. Today, Bass's MLQ 5X is considered a viable tool for assessing leadership styles.

Transformational Leadership Characteristics

Characteristics of transformational leaders include charismatic personalities and a strong orientation toward group performance. Visionary approaches resulting in motivating through an emphasis on meaningful work motivate employees seeking significance in work (Zhu et al., 2009). Transformational leadership theory linking transformational leadership style to performance has been studied over decades and has been proven to be precise in describing the ways transformational leadership influences followers who attain performance in organizations (Corley & Gioia, 2011). Performance variables linked to transformational leadership include task performance, contextual performance, and creative performance (Gong et al., 2009).

The five components of transformational leadership are (a) Intellectual stimulation, (b) inspirational motivation, (c) idealized influence (behavior), (d) idealized influence (attributed), and (e) individual consideration. Leaders exhibiting intellectual stimulation traits encourage employees to be innovative and creative. Employees are asked to look at prior situations and create new ideas. Employees do so with questions and reframing older ideas with new ways of doing things. Leaders exhibiting inspirational motivation traits provide employees with a set of shared goals and the vision necessary to attain them. Leaders use inspirational motivation to effectively communicate abstract concepts, or visions, into practical applications necessary to achieve company goals. Leaders exhibiting idealized influence (behavior) encourage pride in organizations and stress the importance of demonstrating strong commitment. Leaders exhibiting idealized influence behavior traits use role modeling to show behaviors leader's desire of employees. Leaders with idealized influence (attributed) encourage employees to meet goals. Leaders motivate by articulating organizational missions and by encouraging employees to meet goals supporting missions. Leaders exhibiting individual consideration traits understand the personal and professional needs of employees. Leaders motivate by going out of their way to support employees by coaching, teaching, and by facilitating training helpful for employees to meet goals. Leaders utilizing individual consideration help organizations improve performance by changing organizational cultures.

Leadership and Performance

Routroy et al., (2016) completed a study supporting the idea that supplier development programs increased supply chain performance. However, they did not include the effect of cooperation as a factor contributing to supply chain success. Routroy et al., (2016) instead, relied on studying the dependence of suppliers on one another. A consequence of the dependency approach to providing supply chain performance improvement is the degree one company influences another in the chain using corrosive techniques to leverage results.

Cooperation among suppliers (supply chain networks) requires collaboration among employees of multiple companies. Leadership is usually provided by the dominant leader-member of a company in the system. The challenges presented to the leader include: (a) identification of core competencies of each company, (b) identification of needs each company has related to balancing the capabilities of the supply network, and (c) cooperation of participants that are not under the direct supervisory control of the dominant company's supply chain executive. Developing an approach that allows management of the three factors is essential for supply chain partners to create a competitive advantage (Varsei, 2016).

Nowicka (2006) concluded supply chain performance is improved when administering four "Pillars" for success. The goal of the four-pillar approach is to create cooperation among supply

chain partners by changing their relationships. Nowicka (2006) illustrates Routroy et al., (2016) contribution to the concept of dependency by introducing transactional management as the method most often used by dominant supply chain company leaders to entice partnership cooperation. Transactional leadership has not been useful in creating trust and fostering communication (Bass, 1985). Mutual trust was reported as essential in building strong supply chain networks (Kifor & Farooq, 2012). Hoyt & Hug (2000) summarized the reasons for supply chain partnership failures. They are:

- 1.) Mistrust among members
- 2.) Market changes and unexpected events requiring reaction
- 3.) Partners who might become competitors
- 4.) The lengthy duration of projects

Leadership theory can be valuable in understanding ways to improve supply chain performance. Transformational leadership is a style of leadership demonstrated to offer cooperative relationships among people with shared interests but without traditional transactional management command and control frameworks. Essential to success in supply chains are mutual trust and cooperation. Examining the relationship between transformational leadership factors will contribute to understanding how the leadership style helps improve supply chain performance.

Research Method

Eight hundred participants were selected from the CSCMP membership list. A systematic sampling technique was administered. The first participant's name was randomly selected, and then additional members' names were selected based on a fixed interval from the first name. The survey results were anonymous. The process continued until the desired quantity of participants was selected. No special consideration was given to participants, participation was voluntary, and participants could opt-out at any time. Eight hundred names were selected for the sample frame. One hundred surveys were returned. The G*Power Freeware program results indicate a minimum of 75 participant samples satisfies the assumptions entered into the software program. The settings in G*Power provided a power level of .80 with $R^2=0.19$, $\alpha=0.05$. The number of usable responses equaled 82. Faul, et al. (2009) recognize G*Power as valid for research sample estimation.

Two instruments, the MLQ 5X and a questionnaire developed from the Peterson et al. (2005) report, were administered. The MLQ 5X questionnaire provided participants' perceptions of supply chain management leaders' styles. The five transformational leadership sub-categories were analyzed. The MLQ 5X is a fully validated instrument and widely used in research. A coefficient rating above Cronbach $r=0.70$ indicates an acceptable score. Confirmatory factor analysis supported acceptable scores (Defee et al., 2010). The instrument is considered a reliable method for determining the alignment of participants to sub-categories described in the Bass (1985) Transformational Leadership Theory. High reliability and construct validity resulted in the choice of the MLQ 5X instrument. The MLQ 5X validity and reliability scores were validated numerous times with high conformance.

Assessing supply chain performance was accomplished with a second instrument. Participants rated their company's performance based on their perceptions of delivery, quality, and cost performance. The Peterson et al., instrument was selected to test participants' responses on supply chain performance. The Cronbach Alpha scores exceeded $\alpha=0.81$. The high-reliability score and the alignment of questions to the research topic, supply chain performance, justified

the selection of Peterson's (2005) instrument. Variable data was transformed into logarithmic values to ensure a normal distribution of data. Logarithmic values met the test for skewness. The values were less than two times the standard error value. A visual review of P-P plots revealed heteroscedasticity and multicollinearity were within acceptable ranges. A variance inflation factor test ranged from 2.80 to 4.50. Tolerance ranged from 0.22 to 0.39.

Two recognized statistical tests were administered. Pearson's r -correlation was conducted, and regression testing was administered to determine relationships among variables and to determine statistical significance. The independent variables were five sub-categories of transformational leadership styles. The dependent variable was supply chain performance, measured by aggregating several performance variables. Multivariate independent correlation results revealed overlapping relationship values. Regression tests utilized the SPSS statistical software program isolated statistically significant relationships between independent and dependent variables. Regression tests eliminate overlapping scores present in correlation tests. Stepwise regression is recognized as a viable approach to identifying statistically significant results when a small number of independent variables are tested. Stepwise regression is deemed acceptable when the research goal is predictive and not intended to analyze large scientific causal data (Cohen et al., 2003).

Seventy-five participants were required for the study, as determined by G*Power analysis (multiple regression sample based on $R^2=0.19$, $\alpha=0.05$, and $power=0.80$). Eighty-two participants returned completed questionnaire forms. G*Power freeware was used to determine sample size requirements.

Results

Demographic Characteristics Frequency Tables

Position Title	Frequency	Percent
Executive Staff	25	30.4
Director	23	28.0
Middle Management	18	22.0
Senior Buyer	5	6.1
Purchasing Manager	3	3.7
Project Manager	3	3.7
First level Manager	2	2.4
Contract Manager	2	2.4
Chief Procurement Officer	1	1.2
Total	82	100

Company Size	Frequency	Percent
More than 50 employees	72	88
Less than 50 employees	10	12
Total	82	100
Note. N=82.		

Annual Revenue	Frequency	Percent
Revenue less than \$1 million	9	11
Revenue more than \$1 million	73	89
Total	82	100

Note. N=82

Company Type	Frequency	Percent
Manufacturing	42	51.2
Service	40	48.7
Total	82	100

Note. N=82.

Middle to upper-level management dominated the percentage in Tables 1-4. Positions consisted of 60% department directors and above-forty percent of participants identified as department managers and professions in supply chain organizations. There are a higher number of companies with more than 50 employees. Of the eighty-two participants, seventy-two identified with larger companies, over 50 employees. A large percentage of participants identified with companies selling more than \$1 million per year. The industry types represented are split evenly between manufacturing and service companies.

Descriptive Statistics Table

Variable	Min	Max	M	SD	α
Idealized Influence Behavior	0	4	2.2	1.4	.85
Idealized Influence Attributed	0	4	2.3	1.3	.89
Individual Consideration	0	4	1.9	1.3	.86
Inspirational Motivation	0	4	2.4	1.3	.94
Intellectual Stimulation	0	4	2.2	1.2	.87
SCM Performance	3.2	7	5.01	1.0	.70

Note. N=82.

Inferential Statistics Table

Variable	V1	V2	V3	V4	V5	V6
V1. Idealized Influence Behavior (IIB)	-	.804*	.753*	.853*	.761*	-.338*
V2 Idealized Influence Attributed (IIA)		-	.826*	.876*	.777*	.294*
V3. Individualized Consideration (IC)			-	.800*	.782*	.422*
V4. Inspirational Motivation (IM)				-	.828*	.313*
V5. Intellectual Stimulation (IS)					-	.322*
V6. SCM Performance						-

Note. N=82; * $p < 0.01$.

The Pearson correlation Tables 5 & 6 Zhu provides relationship values for all variables. The negative correlation between variable 1 and SCM performance indicates this leadership trait does not contribute to improved supply chain management performance. V2, V4, and V5 report low to moderate relationships between each variable and enhanced supply chain performance. V3 indicates a moderate correlation between the variable and increased supply chain performance.

Multiple independent variable correlations result in “overlapping” results. The overlap is adjusted using multiple regression tests. Regression analysis was performed to eliminate overlaps and to establish statistically significant results. See Table 7.

Variable	<i>Beta</i>	<i>SE_B</i>	β	<i>t</i>
SCM performance	0.851	0.039		21.740*
IC	0.282	0.068	0.422	4.185*
R^2	0.178			
<i>F</i>	17.28			

Note: $R^2=0.178$; $F(1,80)=17.288$, * $p < 0.01$; Excluded variables: idealized influence behavior (IIB), idealized influence attributed (IIA), Inspirational motivation (IM), intellectual stimulation (IS).

One variable, individual consideration, was statistically significant. The R^2 value indicates leaders who demonstrated individual consideration traits; obtain 17% better supply chain management results than leaders who do not demonstrate individual consideration. Four variables were excluded from the stepwise model. The four variables failed to meet the minimal criteria for inclusion. F-test >0.100 resulted in four variables failing to meet statistical significance criteria. Individual consideration was the only significant independent variable included in the regression model.

CONCLUSION

The stepwise regression model beta factor for individual consideration indicates that supply chain leaders with higher levels of individual consideration toward members of supply chains typically obtain better chain performance than leaders who do not exhibit higher levels of individual consideration. Prior studies compared transformational leadership traits to supply chain performance. The current study tested the five sub-categories of transformational leadership to determine if any of the five categories contributed to supply chain performance.

The practical implications for CEOs and others responsible for hiring supply chain leaders are significant. Supply chain leaders typically oversee a vast amount of activities that impact both income statement and balance sheet reports. Cost, quality and delivery performance improved by 17% in organizations whose employees rated their senior leader higher in individual consideration. Consideration for scores on the MLQ 5X instrument for individualized consideration allow better candidate selection for positions responsible leading supply chain management departments.

The current study is different from previous research. Authors of prior research tested the degree the overall category, transformational leadership, contributed to supply chain management performance (Defee et al., 2010). However, previous studies did not test the five individual types of transformational leadership to determine which would contribute most to

performance results. The current research reveals that one transformational leadership style, individual consideration, is best at obtaining improved supply chain performance. An emphasis on individual consideration provides CEOs better supply chain performance than other types of leaders. CEOs can expect an improvement in supply chain management performance when selecting leaders demonstrating individual consideration. Employees whose leaders show interest in employee's goals and personal issues develop trust. Trust is vital in employee leader interaction in supply chain management (Defee et al., 2009).

Summary

A significant supply chain logistics firm (DHL) identified employee skills are lacking in candidates for supply chain management positions. Trust is a significant factor in the process of developing better skills utilizing team-based organizations for improved employee performance. Transformational leadership was examined to determine the degree sub-components of the leadership style to help create better supply chain performance.

Results of a study testing the degree each of the five subcomponents relate to supply chain performance determined that one subcomponent, individual consideration, created a 17% improvement in three areas of supply chain management. Cost, quality, and customer service performance improved when transformational leaders applied "*Individual consideration*" to employees. CEOs appointing leaders scoring strongly in "*Individual consideration*" on the MLQ 5X assessment can expect stronger supply chain management performance than CEOs selecting leaders with weak scores on the MLQ 5X questionnaire.

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