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HOW TRANSFORMATIONAL LEADERSHIP CONTRIBUTES TO PERCEIVED SERVICE QUALITY BY CUSTOMERS VIA THE MEDIATING EFFECT OF ORGANIZATIONAL INNOVATION WITHIN TAIWAN TELECOMMUNCATION COMPANIES

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Abstract

This study examined the effects of transformational leadership on service quality perceived by customers within Taiwan telecommunication companies through the mediation variable of organizational innovation. SPSS 22 was conducted to analyze the data and descriptive statistics, Person correlation coefficient, and sequential multiple regression analysis were used to examine the hypotheses. As a result of this study, no correlation was found between age and service quality perceived by customers. Neither was there a correlation between length of employment and service quality perceived by customers. There was a strong and positive correlation between transformational leadership and perceived service quality by customers, as well as between organizational innovation and perceived service quality. A significant additional predictive power was found for transformational leadership after controlling for covariates, and another mediating variable (organizational innovation) mediated the relationship between transformational leadership and customers' perception of service quality after controlling for covariates.

It provided valuable insight into the main guidelines for improving customer perception of the offered service to Taiwanese telecommunication companies. To enhance service quality perceived by customers, chief executives should develop a more individualistic approach, develop knowledge and innovation, and employ their

own charismatic personalities. Because of the above conclusion, Taiwan's telecommunication industry should seriously consider how organizational innovation can be leveraged to improve service quality perceived by its customers. Furthermore, as a leader of these companies, he was supposed to develop their own unique organizational innovation that included both technological improvements and better incentives strategies to spur product adjustments, process changes, new marketing strategies, and new distribution formalities.

Keywords: Transformational Leadership, Organizational Innovation,
Service Quality, Telecommunication Companies

Introduction

In the various service industries, quality service has become a key competitive capability, so they must ensure that customers' expectations are met and even exceeded (Ehrhart et al., 2011). Transformational leadership can enhance service quality by enhancing individual consideration and empathy to boost employees' ambition, innovation, sense of achievement, as well as commitment to the workplace (Liao and Chuang, 2007; Abu Orabi, 2016). According to research, transformational leaders could make a positive influence on perceived efficiency of information and communication companies by emphasizing the importance of effective use of information technology (Yee, 2000; Seyal, 2015). It is an undeniable fact that all information and communication industries are characterized by a dynamic and rapid technological change, simplifying service procedures, and globalization. Therefore, these technology - driven companies must survive through their irreplaceable innovation capabilities. During a forum held by the Institute for Information Industry, the Marketing Intelligence and Consulting Institute reviewed the Taiwan telecommunication enterprises in 2021.

According to the main context of this forum, Taiwan's telecom business in 2020 was: the spread of COVID 19 virus and the trade war between America and China caused an 8 % drop in the global output value of communication equipment (Market Intelligence & Consulting Institute, 2021). Yet, they still looked forward to estimating that the global telecommunications industry would grow at a rate of 15. 7 % and hit $673. 1 billion Taiwanese dollars in total output. This prediction was attributed to the combination of global economic recovery, gradual prosperity

and rapid growth of mobile installations and relevant equipment as well as high demand for 5G Telecom network equipment and data centers (Market Intelligence & Consulting Institute, 2021). It was predicted that the number of 5G subscribers would be estimated at over 600 million, so global telecommunications firms are anticipating more diversified services of private 5G networks, more vertical integration and more customized demand services (Market Intelligence & Consulting Institute, 2021).

In today's competitive and globalized market, telecommunication companies will emphasize that E - Service Management will have to offer better services to their customers because of improving the process and utilization of the service. Therefore, the E - service quality would have gradually become a core competency for all service industries (Jia & Reich, 2011; Hoerbst et al., 2011). Leading telecom corporations around the world are striving to increase internal and external efficiencies to form competitive advantages, so their top executives are focused on motivating organizational innovations to enhance customer satisfaction and service quality (Demir et al., 2020).

Research Framework

Research suggests that chief executives have a profound impact on organizational innovation, whether through the impact they have on culture, strategy, structure, reward systems, external and internal support systems, and employee innovation (Jung, Chow, and Wu, 2003; Demir & Budur, 2019). In the wake of depreciating prices of computers and internet, virtual reality technologies, and artificial intelligences, telecommunication companies facilitate communication of people's lives, store and process their data, and simplify business redundant procedures to be more cost - effective, so they have developed into multi - national corporations that attract foreign investors (Jung, Chow, and Wu, 2003; Demir et al., 2020). The role of transformational leaders as chief executives affects not only innovation within the firm, but also the marketing of those products and services (Chandna & Krishnan, 2009). Recently, transformational leadership has been studied in relation to improving job performance, improving service quality, and fostering organizational innovation (Demir et al., 2020).

In the current telecommunications industry, transformational leadership and organizational innovation

have a positive impact on improving service quality due to the influence of top administrators and executives (Schepers, Wetzels & de Ruyter, 2005; Kox, 2002). Currently, there is not enough research and relevant literature on this topic to explore the impacts of transformational leadership by chief executives and organizational innovation on the service quality offered by Taiwan's telecommunication companies. A lack of relevant studies spurred the researcher's intense motivation to investigate the above issue further so that Taiwan's telecommunication companies can compete in today's globalized and fiercely competitive market. Specially, it would be helpful to explore the relationship between leadership styles of chief executives within Taiwan registered companies and their customers' perceptions of the services they received through the mediation effect of organizational innovation mediator variables.

Literature Review

Four main areas are addressed in this literature review:
(a). organizational characteristics and development of Taiwanese telecommunication companies,
(b). transformational leadership in the telecommunications sector,
(c). organizational innovation in the telecommunications sector, and
(d). customer perceptions of service quality.

(A). organizational characteristics and development of Taiwanese telecommunication companies.

As the telecommunications industry in Taiwan was originally run exclusively by the General Adminis - tration of Telecommunications, the Ministry of Transportation and Communication (MOTC) has promoted the policy of "privatization of telecommunications" since 1996 to make the industry more competitive and improve service quality. As of 1996, the Ministry of Transportation and Communication (MOTC) gradually loosened the relevant legal restrictions and allowed private enterprise operators to enter the telecommunications business (Market Intelligence & Consulting Institute, 2021). Since then, the operation of telecommunications enterprises in Taiwan has been governed by the Telecommunications Act and other provisions, and the competent authority is the National Commun - ications Commission (NCC). According to the Telecommunications Act, telecommunications enterprises are classified as Type I and Type II. A Type I telecommunications enterprise cannot operate without franchise and license is-

sued by the Ministry of Transportation and Communication (MOTC). Type II telecommunications enterprises must register with the Ministry of Transportation and Communication (MOTC) (Market Intelligence & Consulting Institute, 2021).

Type I telecommunications enterprises include mobile communications, fixed communications, and satellite communications, and according to the National Communications Commission (NCC) on February 5, 2020, there were 82 Type I telecommunications businesses with 105 licenses (National Communications Commission, 2021). Telecommunications businesses that are not Type I telecommunications enterprises are Type II. According to the National Communications Commission (NCC) statistics, there are 359 Type II telecommunication businesses registered with the Ministry of Transportation and Communication as of September of 2020 (National Communications Commission, 2021). As estimated by the Marketing Intelligence and Consulting of the Institute for Information Industry in 2021, the estimated output value would grow by 9. 5%, which would amount to approximately 3920 billion Taiwanese dollars. The main factors could be attributed to mobile and wireless communication, with the former growing by 10. 4 %, driven by high consumer demands and the 5G replacement wave, while the latter hit 19. 4 % of the overall output value for Taiwan's telecommunications industry (Market Intelligence & Consulting Institute, 2021). The most significant focus would be to plan for the exponential growth of the usage rate of 5G in 2021. It was predicted that the number of 5G subscribers would be estimated at over 600 million, so global telecommunications firms are anticipating more diversified services of private 5G networks, more vertical integration and more customized demand services (Market Intelligence & Consulting Institute, 2021). Additionally, work from home (WFH) has significantly influenced Taiwan's telecommunications industry, resulting in a high demand for Wi - Fi, and COVID 19 has had a marketing reversal, so related products and services are required to meet these high expectations.

(B). Transformational leadership in the telecommunications sector

Companies in the telecommunication sector offer well - developed e - services that may increase competitive capabilities, optimize processes, enable various access, and support the use of 5G networks (Demir et al., 2020). In the information and communication industry, frontline workers can simultaneously accomplish production, sales,

and customer service at the same time (Liao & Chuang, 2017; Ledimo, 2014). As a result of service quality becoming a key competitive advantage, telecommunication companies must ensure that customers' expectations are met and even exceeded (Ehrhart et al., 2011; Edirisooriya, 2020). Transformational leadership could enhance service quality by enhancing individual consideration and empathy to boost employees' ambition, innovation, sense of achievement, as well as commitment to the workplace (Liao & Chuang, 2017).

In recent studies, transformational leadership has been shown to be crucial to the successful implementation of information technology (Schepers, Wetzels, & de Ruyter, 2005; Piccolo and Colquitt, 2006; Sayyadi, 2020). Researchers have shown that transformational leadership can improve service quality by creating an admirable and inspiring mission, setting achievable goals, emphasizing collective brainstorming, and gradually establishing a shared core value and commitment (Yee, 2000; Seyal, 2015; Liao and Chuang, 2007). When leaders demonstrate transformational leadership, their employees gain a greater sense of recognition for their organizations, gain more psychological empowerment, and improve their job performance and service quality (Piccolo and Colquitt, 2006; Li & Yuan, 2017; Su et al., 2019). In the information and communication industry, research also indicates that transformational leadership has a positive impact on customer service quality. (Liao and Chuang, 2007;Tse and Chiu, 2014; Yee, 2000; Seyal, 2015) .

(C). Organizational innovation in the telecommunications sector

It is an undeniable fact that all information and communication industries are characterized by a dynamic and rapid technological change, simplifying service procedures, and globalization. Therefore, these technology - driven companies must survive through their irreplaceable innovation capabilities (Tse & Chiu, 2014 ; Sayyadi, 2015). Three types of organizational innovation can be distinguished: (1) organizational structure and design theories, such as contingency and industrial economics theories, (2) organizational cognitive and learning theories, and (3) organizational change and adaptation theory, such as internal integration and external connections necessary for organizational behavior. (Fadil, Singh & Joseph, 2015). Designed by Magdley and Birdi's in

2012, the measure of organizational innovation looked at how various factors influence innovation, such as self - efficacy, domain expertise, team support for innovation, team participation safety, organizational support, organization flexibility, and idea generation and implementation.

The measured characteristics are defined as follows:

1. Creative self - efficacy: the ability to produce new and creative ideas.
2. Domain expertise: the level of experience and knowledge in a specific subject matter.
3. Team support for innovation: team member support for producing and implementing creative and new ideas.
4. Team participation safety: the level of team buy - in, understanding, and acceptance of innovation efforts. Team collaboration on work - related issues.
5. Organizational support for innovation: this support is measured by the provided time, assistance, cooperation, and practical support.
6. Organizational flexibility: The organization's reaction to change of the organization.
7. Idea generation: how many new ideas have been generated in the past three months? New ideas encompass policies, services, work procedures, or products as methods to realize targets or objectives.
8. Idea implementation: how many of the new ideas have been implemented in the past three months?

The role of transformational leaders as chief executives affects not only innovation within the firm, but also the marketing of those products and services (Schepers, Wetzels, & de Ruyter, 2005; Chandna & Krishnan, 2009). Chief executives of telecommunication companies may implement transformational leadership by empathizing with the current challenges their employees are facing, and then setting up a role model to inspire their potential and innovation to solve the dilemma. (Chandna & Krishnan, 2009). According to numerous research studies, transformational leadership plays an important role in boosting organizational innovation through internal and external support(Chandna & Krishnan, 2009). In order to meet current ever - changing technology and globalization, a transformational leader could implement appropriate strategic decisions, operational policies, and supplementary measures to inspire employees' unique innovation and creativity to resolve thorny issues (Prasad & Junni, 2016). To meet customers' varied demands, organizational in-

novation has evolved as the inevitable mainstream in the current telecommunication sector that includes more multidimensional products and enhanced service quality (Gumusluoğlu & Ilsev, 2009).

(D). customer perceptions of service quality.

Service quality has been defined as the gap between consumers' perceptions and their expectations of the services they receive from service - based companies (Asubonteng et al., 1996; Parasuraman et al., 1985). Service quality is characterized by four main characteristics: 1. intangibility, 2. heterogeneity, 3. perishability, and 4. inseparability. Often, intangibility is the most decisive factor affecting customer perception of service quality (Parasuraman et al., 1985). The service quality is determined by the perceptions and evaluations of the customers, which are the driving forces behind the continuous quality improvement of products or services offered (Chang, 2008; Gi - Du et al., 2002). The lack of physical determinants has caused quality control and measurement issues due to the intangibility of service quality. Additionally, these same situations are likely to be entangled with service variability, inseparability, and perishability.

The quality of service has gradually become a core competency in making strategies within all service industries, so it is imperative that service - oriented companies offer more excellent services to their customers to compete in today's market of fierce competition and globalization (Chang, 2008; Gi - Du et al., 2002). According to studies, the quality of service is determined by the overall evaluation of the service provided by the customer and whether it meets or exceeds their expectations (Eshghi et al., 2008). As mobile technology has made its way into the lives of modernized people, telecommunications industries play a critical role in the e - service sector. Moreover, the emergence of virtual reality technology and the spread of streaming platforms that have allowed for service quality, customer satisfaction, and brand loyalty are urgently needed in this field (Eshghi et al., 2008).

The SERVQUAL instrument is widely used by a variety of service industries to evaluate key determinants, redress insufficiencies and reinforce the superiority of the original services provided (Parasuraman et al., 1988; 1991;). Parasuraman (1988) developed the SERVQUAL instrument for identifying discrepancies

between customers' perceptions and what they receive from service providers. SERVQUAL is a quantitative measurement instrument that consists of 22 statements to assess customers' perceptions and expectations of offered services, graded from strong disagreement to strong agreement. The statements of this questionnaire refer to the attributes or dimensions of service quality (Parasuraman et al., 1988; 1991). The SERVQUAL Instrument measures the five dimensions of Service Quality. These five dimensions are: tangibility, reliability, responsiveness, assurance and empathy.

1. Tangibility – The tangible nature of the offered services allowed customers to evaluate their perceptions of the service by examining the tangible facilities, equipment, and personnel, as well as all external physical supply chains.
2. Reliability –Their reliability means their offered services are reliable, trustworthy, safe, and precise, and this includes service delivery, service supplies, the capability to handle unexpected problems, and pricing. Service providers should be required to maintain their promised services and core service attributes. Reliability of offered services represents the direct way of delivering the core service for all service providers.
3. Responsiveness – Responsiveness is the intention to offer prompt services that are focused on attentiveness and promptness in resolving all problems, grumbles and seeking better communication with the customer. Furthermore, it may symbolize a customer - oriented and flexible business practice that understands their appeals and needs right away.
4. Assurance – The dimension of assurance is so important because it refers to the practice of monitoring the quality of customer conversations, derived from the core competency of the service provider. It can help service - based businesses measure and improve the performance of their teams and the overall customer support process to gain a competitive advantage and to ensure customer loyalty.
5. Empathy –Empathy is the concern, individualized attention that your organization provides to customers, and they want to feel like their business is more than just a transaction; they want to form a relationship with your business within the physical product and services. Above all, it enhances trust and confidence, which converts to brand loyalty.

In the information and communication industry, the SERVAUAL instrument is well - known as a reli-

able and valid instrument to measure the strengths and shortfalls of e - service provided to customers (Badri et al., 2005; Chen, Yang, Shiau, & Wang, 2006). Studies showed that improving employee - customer orientation positively impacts customer satisfaction, customer commitment and brand loyalty (Brady and Cronin, 2001; Chen, Yang, Lin, & Yeh, 2007). Due to the lack of objective measurement, all service - oriented businesses must rely on the SERVQUAL instrument to measure the discrepancy between customer perceptions of service and what they were expecting to receive to determine the key factors that impact service quality (Gil, Berenguer, & Cervera, 2008). Additionally, SERVQUAL measurement has identified key attributes that facilitate the delivery of e - services and high - quality services in the telecommunications industry (Parasuraman, Zeithaml, & Berry, 1988; Yang, 2007).

Method

Methodology and Data Analyses

The operation of telecommunications and communication enterprises in Taiwan was governed by the Telecommunications Act and other provisions, and the National Communications Commission (NCC) is the competent authority. According to the Telecommunications Act, telecommunications enterprises are classified as Type I and Type II. National Communications Commission (NCC) data showed that there were 82 Type I telecommunications businesses registered with it on February 5, 2020, with 105 licenses, and that there were 359 Type II telecommunications businesses registered with it on September 30, 2020 (National Communications Commission, 2021). To conduct this study, the target population of the survey had to be divided into two groups: the first group was referred to as full - time employees within Taiwan telecommunication companies legally registered with competent authorities; the second group was randomly selected customers from the same telecommunication companies. The researcher distributed 400 hardcopies of the Multifactor Leadership Questionnaire and the Organizational Innovation Assessment Instrument to the full - time employees of 70 of the 442 companies, including Type I and Type II companies registered with the Ministry of Transportation and Communication, and 310 valid and complete responses were received, for a return rate of 77. 5 %.

In addition, the researcher distributed 400 hardcopies of the SERV - QUAL instrument to the same 70 randomly selected customers from the 442 companies, and 310 valid and complete responses were received, resulting in a 77. 5 % return rate. All statistics were computed by the SPSS. The instruments used for data collection in this study were the Chinese versions of Multifactor Leadership Questionnaire, the Organizational Innovation Assessment Instrument, and the SERVQUAL Instrument. As to checking reliability, using Cronbach's alpha coefficient is to assess whether such questionnaires are reliable and trustful (Gliem & Gliem, 2003). In this study, the reliability was assessed by the Cronbach alpha coefficient of transformational leadership was . 89; the Cronbach alpha coefficients of organizational innovation were . 85, respectively and the SERVQUAL instrument . 92, respectively. Pearson correlation coefficients, and sequential multiple regression analysis to determine the relationships among these variables and to examine the hypotheses of the study.

Demographic Analysis

To generate actionable and meaningful results when analyzing a survey, significant demographic characteristics, such as age, gender, marital status, and education level, should be collected and reported (Perry & Mackun, 2001; Schutt, 2006). In this study, the first group of 310 participants qualified as full - time employees within Taiwan telecommunicator companies registered with competent authorities. Six demographic characteristics of the 310 participants were collected. Four of the demographic characteristics were categorical variables - gender, marital status, education level, and job classification—while the other two were continuous ones—age and length of employment. An investigation of the relationship between leadership styles of top administrators or chief executives within Taiwan registered companies and their customers' perceptions of the services they received through the mediation effect of organizational innovation mediator variables has been undertaken. Answers were sought to the following questions:

1. Are transformational leadership, organizational innovation, and demographic covariates associated with customers' perception of service quality?
2. Does transformational leadership predict customers' perception of service quality after controlling for covariates?

3. Does organizational innovation mediate the association of transformational leadership and customers' perception of service quality after controlling for covariates?

The three null hypotheses were the following:

H1: Transformational leadership, organizational innovation, and demographic covariates are not associated with customers' perception of service quality.

H2: Transformational leadership cannot predict customers' perception of service quality after controlling for covariates.

H3: Organizational innovation does not mediate the association of transformational leadership and customers' perception of service quality after controlling for covariates.

Results

H1: Transformational leadership, organizational innovation, and demographic covariates are not associated with customers' perception of service quality.

In this study, the correlation coefficient r was - . 047, and the *Sig* value was . 407, which is more than . 05. There was no correlation between age and perception of the offered services. Furthermore, the results found that there was no correlation between length of employment and customers' perceptions of offered services, as the correlation coefficient was - . 064, and the *Sig* value was . 262, which violated the thumb rule that it must be less than . 05. Based on the rule of thumb, strong relationship: r = . 5, moderate relationship: r = . 3, and weak relationship: r = . 1 (Cohen, 1988). It was found that Taiwan's chief executives did not need to consider employees' age or length of service to improve customers' perceptions of their office services.

In contrast, there was a strong correlation between transformational leadership of top administrators and customers' perception of offered service quality, r = . 672, which accounted for 45. 15 % of their variance in transformational leadership of chief executives on customers' perception of their offered service quality. There was a high and positive correlation between transformational leadership and customer perceptions of service quality. Therefore, the null hypothesis was rejected. Further, the Pearson coefficient r = . 689 was responsible for 47. 47% of the variance in organizational innovation on cus-

tomer perception of service quality. There was also a positive correlation between organizational innovation and customer perception of service quality, so neither conclusion was rejected.

H2: transformational leadership cannot predict customers' perception of service quality after controlling for covariates.

In this study, sequential multiple regression was conducted to predict the outcome variable (service quality perceived by customers) through the predictor variable (transformational leadership) after controlling the covariates. The results of this study showed that in Model Summary showed that the variability in the dependent variable of service quality perceived by customers was accounted for by the R^2 value by all the predictor variables. Model 1 represents the covariates that accounted for 3. 4 % of variability in the dependent variable of service quality perceived by customers. Likewise, the R^2 value from Model 2 shows there was 48. 0 % of variability in the dependent variable.

Note that this R^2 value included all the predictor variables from both blocks, not just transformational leadership in Model 2. To find how much variability was interpreted by the assigned variables of interest by the fixed order (transformational leadership) after the covariates were removed, it was necessary to observe the R^2 Change column in the model summary. A total of 44. 6 % of variance in service quality perceived by customers was accounted for by transformational leadership after controlling for covariates. According to Block1, the *Sig* value in Block1 was . 32, much greater than . 05, indicating that it did not significantly affect the dependent variable, customer perception of service quality. However, the *Sig* value was . 000, less than . 05 in Block 2, indicating that it contributed significantly to the dependent variable of service quality perceptions. In short, the null hypothesis was rejected because transformational leadership had a significant additional predictive power on organizational commitment after controlling for covariates.

H3: Organizational innovation does not mediate the association of transformational leadership and customers' perception of service quality after controlling for covariates.

In this study, a path analyses model was conducted to find out whether transformational leadership

(independent variable) had direct or indirect effects on service quality perceived by customers (dependent variable) via the mediation effect of organizational innovation (mediator variable) after controlling for covariates. Before the actual test of mediation could take place, it was necessary to confirm that all simple linear regressions were significant. If any of these paths had not been significant, then the test of mediation would have ended here, and the conclusion would have been that there was no mediation effect between transformational leadership and service quality perceived by customers.

Examining path a.

First, it was necessary to ensure that the IV (transformational leadership) was a significant predictor of the MV (organizational innovation) after controlling for covariates. In other words, it needed to be determined whether path *a* existed. To do so, sequential multiple regression had to be performed to assess the contribution of variance of the IV (transformational leadership) on the MV (offered service quality perceived customers) after controlling for covariates. The results of this study showed that the variance in dependent variable (organizational innovation) was accounted for by the R^2 value by all the predictor variables. The covariates were entered Block 1, transformational leadership (the predictor variable of interest) was entered Block 2, and organizational innovation (mediator variable) was entered the dependent box. The model summary showed that the variability in the dependent variable (organizational innovation) was accounted for by the R^2 value by all the predictor variables.

Model 1 represents the covariates that accounted for 2. 9 % of variability in the dependent variable of organizational innovation. On the other hand, the R^2 value from Model 2 also shows 85. 9 % of variability in the dependent variable. Note that the R^2 value includes all the predictor variables from both blocks, not just transformational leadership in Model 2. To find how much variability was interpreted by the assigned variables of interest by the fixed order (transformational leadership) after the effects of the covariates were removed, it was necessary to observe the R^2 Change column in the model summary. The value shown for Model 2 was 83. 0 %, indicating that transformational leadership accounted for an additional 83. 0 % of variance in organizational innovation after controlling for covariates. This meant

that there was additional predictive power of transformational leadership in Model 2 (the predictor variable of interest) and reached significant contribution on the dependent variable of organizational innovation. In addition, the *Sig* value of Block 1 was greater than . 05 suggesting that there was no additional contribution to organizational innovation, while the *Si*g value of Block 2 was . 000 evidently less than . 05, indicating that the assigned variables of interest by the fixed order (transformational leadership) could contribute to organizational innovation.

Examining path b.

Next, it was necessary to examine whether the MV (organizational innovation) was a significant predictor of the DV (service quality perceived by customers) after controlling for covariates. In short, it needed to be determined whether path *b* existed. The model summary showed that the variability in the dependent variable (service quality perceived by customers) was explained by the R^2 value by all the predictor variables. Block l represented the covariates that showed 3. 4 % of variability in the dependent variable of organizational commitment. Likewise, the R^2 value from Block 2 indicated that 50. 3 % of variability in the dependent variable. Note that the R^2 value included all the predictor variables from both blocks, not just transformational leadership or clan culture in Block 2. To account for how much additional predictive power of the two predictor variables of interest after the effects of the covariates were removed, it is required to observed the R^2 Change column in the model summary. The value shown for Block 2 was 46. 9 %, indicating that transformational leadership and organizational innovation accounted for an additional 46. 9 % of variance in perceived service quality by customers after controlling for covariates. As mentioned above, the path *b* proved that it exited.

Examining path c.

As to examining whether the IV(transformational leadership) was a significant predicator of the DV(service quality perceived by customers) after controlling for covariates, or path *c*, this relationship was proven to exist previously when Research Question 2 was answered. It was necessary to observe further to determine if path *c* changed when the MV (organizational innovation) was added to the original multiple regression analysis. As it is impossible for full mediation to occur, the indirect effect of partial mediation must be calculated using a Sobel test calcula-

tor (Dudley, Benuzdillo, & Carrico, 2004). By looking at the *p* values of the Sobel test, one could determine whether partial mediation was significant different from zero (Dudley et al., 2004).

It is commonly recommended to use the interactive and web - based calculation software provided by Preacher and Leonardelli (2001) to calculate the indirect effect of partial mediation. The online calculator first instructed the user to enter the path *a* and path *b* coefficients (*B* value of unstandardized coefficients) and the standard errors of path *a* (S*a*) and path *b* (Sb) into the cells. In this study, the path *a* coefficient was . 941 the path *b* coefficient was . 562, Sa was. 022, and Sb was . 150.

After entering these values into the cells, this program calculated the critical ratio as a test of whether the indirect effect of the IV on the DV through the mediating variable was significantly different from zero. The results of the Sobel test showed that the test statistic was equal to 3. 73, with a standard error of 0. 1416, and *p* value less than . 001. The Sobel test provided obvious evidence to support partial mediation from IV (transformational leadership) to the DV (service quality perceived by customers) by the mediator variable (organizational innovation) after controlling for covariates. In conclusion, the null hypothesis was rejected because organizational innovation had a significant mediating effect between transformational leadership and service quality perceived by customers after controlling for covariates.

Recommendations

Following are the main guidelines provided by this study to the chief executives of Taiwanese telecommunication companies for improving service quality perceived by customers. First, top administrators or chief executives should be encouraged to participate in transformational leadership programs so they can develop more well - developed theoretical foundations and practices of this leadership to increase service quality perceived by customers. The quality of service can be improved by setting achievable goals, emphasizing collective brainstorming, and gradually establishing a shared core value and commitment through transformational leadership.

Table 1. *Calculation for the Sobel Test for Examining the Mediation Effect (Organizational Innovation) Between Transformational Leadership and Sum of Organizational Commitment*

Input	Test	Test statistic	*SE*	*p* value
a=. 941	Sobel	3. 73237507	0. 14169048	0. 00018968
b=. 562	Aronian	3. 7313632	0. 1417289	0. 00019045
Sa=. 022				
Sb=. 150.				

Note. Table adapted from " Calculation for the Sobel Test, " by K. J. Preacher and G. j. Leonardelli, 2001. Retrieved from http://quantpsy. org/sobel/sobel. htm

Secondly, Taiwan's top management should seriously consider how organizational innovation can be incorporated into customer service quality improvement. Because of organizational innovation, employees will be motivated to learn continuously, be flexible, and adapt to rapid changes in technology and globalization, leading to improved performance and service in the organization.

They should also initiate more transformational leadership to enhance organizational innovation by encouraging their employees to think outside the box, to collaborate with each other, and to provide more external and internal support chain supplies to achieve excellent service quality. Furthermore, as a leader of these companies, he was supposed to develop their own unique organizational innovation that included both technological improvements and better incentives strategies to spur product adjustments, process changes, new marketing strategies, and new distribution formalities. The researcher concluded that Taiwan telecommunication company executives should effectively combine transformational leadership and organizational innovation that encompasses knowledge and service innovations to improve the perception of service quality by customers.

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