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Leadership and Supply Chain Management Practices in Fourth-Party Logistics: An Empirical Analysis

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ABSTRACT

Supply chain management has become a critical managerial function for organizations seeking to enhance operational efficiency and sustain competitive advantage. Leadership styles, particularly transformational and transactional leadership, play an important role in shaping managerial approaches and influencing the implementation of supply chain management practices. The aim of this study is to examine the impact of transformational and transactional leadership styles on supply chain management practices within Fourth Party Logistics (4PL) service providers. The study is based on survey data collected from managers working in the operations and supply chain departments of 4PL service provider companies. The proposed research model was analyzed using the Structural Equation Modeling (SEM) technique with the SmartPLS software. The findings indicate that transformational leadership has a positive and significant effect on strategic supplier partnerships. In addition, transactional leadership was found to have a significant and positive impact on the quality of information sharing within supply chain processes. The results reveal that leadership styles play an important role in shaping supply chain management practices. In particular, the leadership approach and managerial perspective of top management in 4PL service provider firms significantly contribute to the effective and efficient functioning of supply chain processes. Although previous studies have examined leadership and supply chain management in various contexts, research focusing on the role of leadership in the effective management of supply chain practices within 4PL service providers is limited. Therefore, this study contributes to the literature by addressing this gap and providing empirical evidence on the relationship between leadership styles and supply chain management practices in the 4PL context.

Keywords: Fourth party logistics, Supply chain management, Supply chain leadership, Supply Chain Performance
Jel Codes :M10, L25, M12

Dördüncü Taraf Lojistikte Liderlik ve Tedarik Zinciri Yönetimi Uygulamaları: Ampirik Bir Analiz

ÖZET

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Tedarik zinciri yönetimi, operasyonel verimliliği artırmak ve rekabet avantajını sürdürmek isteyen kuruluşlar için kritik bir yönetim fonksiyonu haline gelmiştir. Liderlik stilleri, özellikle dönüşümsel ve işlemsel liderlik, yönetim yaklaşımlarının şekillenmesinde ve tedarik zinciri uygulamalarının etkin bir şekilde uygulanmasında önemli bir rol oynamaktadır. Bu çalışmanın amacı, dönüşümsel ve işlemsel liderlik stillerinin Dördüncü Taraf Lojistik (4PL) hizmet sağlayıcılarında tedarik zinciri yönetimi uygulamaları üzerindeki etkisini incelemektir. Araştırma, 4PL hizmet sağlayıcı şirketlerin operasyon ve tedarik zinciri departmanlarında görev yapan yöneticilerden elde edilen anket verilerine dayanmaktadır. Önerilen araştırma modeli, SmartPLS yazılımı kullanılarak Yapısal Eşitlik Modellemesi (SEM) tekniği ile analiz edilmiştir. Bulgular, dönüşümsel liderliğin stratejik tedarikçi ortaklıkları üzerinde olumlu ve anlamlı etkiler yarattığını göstermektedir. Ayrıca, işlemsel liderliğin tedarik zinciri süreçlerindeki bilgi paylaşımının kalitesini önemli ölçüde artırdığı bulunmuştur. Elde edilen sonuçlar, liderlik tarzlarının tedarik zinciri yönetimi uygulamalarının şekillenmesinde kritik bir rol oynadığını ortaya koymaktadır. Özellikle, 4PL hizmet sağlayıcı firmaların üst yönetimindeki liderlik yaklaşımı ve yönetim anlayışı, tedarik zinciri süreçlerinin etkin ve verimli işleyişine önemli katkılar sağlamaktadır. Önceki çalışmalar, liderlik ve tedarik zinciri yönetimini çeşitli bağlamlarda incelemiş olsa da, 4PL hizmet sağlayıcıları özelinde tedarik zinciri uygulamalarının etkin yönetiminde liderliğin rolünü ele alan araştırmalar sınırlıdır. Bu nedenle, bu çalışma, söz konusu boşluğu doldurarak 4PL bağlamında liderlik stilleri ile tedarik zinciri yönetimi uygulamaları arasındaki ilişkiye dair ampirik kanıtlar sunmakta ve literatüre önemli bir katkı sağlamaktadır.
Anahtar Kelimeler: Dördüncü taraf lojistik, Tedarik zinciri yönetimi, Tedarik zinciri liderliği, Tedarik zinciri performansı
JelKodları: M10, L25, M12

INTRODUCTION

Globalization leads to open communication across all boundaries, and both domestic and international markets are highly competitive. Additionally, it is important to consider ways to increase revenue, productivity, and quality while lowering costs, defects, and lead times for customer delivery To achieve these goals, all actors in the value chain collaborates. Supply chain management enables independent companies to establish collaborative relationships and coordinate processes among participants. As a result, it creates greater value for customers and supply chain partners and improves the overall performance of the supply chain for individual companies (Sundram et al., 2016). Nowadays, the emphasis has switched from enhancing the performance of individual organizations to improving the performance of the entire supply chain. This shift in emphasis helps businesses use resources more efficiently, improve the quality of their goods or services, speed up customer service, and increase organizational flexibility to cope with variability from customers and services.

Supply chain leadership, on the other hand, focuses on the behavior of firms and has been formulated in the literature based on a classical understanding of leadership. Akhtar et al. (2017), Defee et al. (2009) and Ojha et al. (2018) stated that "Supply chain leadership can influence the actions, behaviors and performance of supply chain members." Briefly, the concept of "supply chain" refers to a group of actors who frequently work together to complete all tasks involved in product manufacture and consumer delivery. Understanding how industrials, large retailers, component suppliers, wholesalers, and logistics service providers interact is essential for managing the flow of goods and information in an increasingly complex, competitive, turbulent, and global environment. To increase the efficiency of supply chain processes, several logistics service providers are contributing to the development of emerging economies (Fulconis and Paché, 2018).

The improvement of supply chain performance, and more crucially the timely and efficient administration of logistical tasks, is made possible by Fourth Party Logistics (4PL) providers (Win, 2008). 4PL services go beyond traditional Third Party Logistics (3PL), which primarily focus on operational activities such as transportation, warehousing, and distribution (Fulconis and Paché, 2018). Unlike 3PLs, 4PL providers act as strategic integrators, combining and managing the resources, capabilities, and

technologies of both their own organization and other complementary service providers to deliver comprehensive, high-value logistics solutions (Gattorna, et al., 2004; Lentz, 2015). Saglietto (2013) classifies 4PL providers into four main categories: (1) those handling documentation and data management for large projects; (2) software- and consultancy-oriented providers offering logistics planning and supply chain advisory services; (3) 4PLs linked to global logistics groups that optimize network and data flows; and (4) pure 4PL providers that manage and optimize supply chains without owning physical assets, relying instead on intellectual and technological resources. 4PL providers act as a single strategic interface between clients and supply chain services, covering all outsourced processes and functioning as strategic partners. While traditional 3PLs focus on operational execution and adaptation, 4PLs emphasize strategic, technology-supported supply chain solutions (Güleş et al., 2010). The non-asset-based nature of 4PL structures allows these providers to leverage networks and expertise to offer high-value services to supply chain partners (Selviaridis and Spring, 2007).

With this in mind, our study is designed to address at least two important gaps in the leadership and supply chain literature. The number of studies incorporating all variables relevant to this research topic is extremely limited. Therefore, the motivation of this study is to fill the gap in the literature regarding leadership and supply chain management practices in 4PL service providers. Specifically, we examine how top-level leadership (both transformational and transactional) affects supply chain management practices within 4PL service providers.In this context, leadership plays a critical role in the performance and effectiveness of 4PL service providers (Akhtar et al., 2017; Defee et al., 2009).

1. THEORETICAL BACKGROUND

1.1. Supply chain leadership and supply chain management practices

Leadership is "the activity of leading and guiding the conduct of the employees in a certain work setting," according to researchers (Jermsittiparsert and Srihirunc, 2019). Leadership is the capacity to decide what to do and persuade others to follow suit (Moorthy, 2014). Leadership is the ability to prepare an organization to handle the necessary changes that will occur (Ratcliffe and Ratcliffe, 2015). All of these operations are accomplished by the leader in order to train future supply chain leaders, continuously enhance as a leader, and establish and achieve a vision for the supply chain that supports the organization's goal and strategy (Defee, 2007). Lambert et al. (1998) stated, “If leadership is not established at the strategic decision-making level, it can cause organizations to face turmoil and danger.”

Previous studies suggested that the leadership structure is a part of supply chain management. More focus is now being given to developing effective leadership concepts that are accountable for maintaining supply chains and monitoring their performance and development (Sharif and İrani,2012). Supply chain leaders can be recognized by their knowledge of the trading franchise, customer loyalty, financial clout, and the scope of inter-firm linkages. In addition, a supply chain leader adapts their approach to the organization they are supporting (Jermsittiparsert and Srihirunc, 2019). Previous studies stated that management approaches and leadership would have an impact on supply chain management systems.

Transactional and transformational leadership styles are two general categories for supply chain leadership. Transformational leadership aims to increase followers' understanding of what is significant and tends to inspire them to put their organization's needs ahead of their self-interest.

In various ways, each feature of transformational leadership can promote follower commitment. Identification with the leader's goals, emotions, and ideas results from following the leader's approach or feeling emotionally connected to him or her. A leader can more easily increase commitment to a group's or organization's beliefs, goals, or standards of behavior if they set a model for followers and act by those standards. Utilize inspiring motivation to create an emotional commitment to complete a task or reach a goal (Bass and Riggio, 2006; Nugraha et al., 2019; Sánchez et al., 2020).

As a result, these leaders in businesses place a greater emphasis on supporting the requirements of their workforce by applying the path goal idea. Transactional leadership promotes relationships of exchange between followers and leaders, who give followers financial or non-financial rewards in exchange for providing the required performance, as opposed to transformational leadership (Brisnav, 2013). The involvement of leaders driving transformation in supply chain management is considered crucial. Technological innovation enables process optimization and improved agility. Digital innovation enables process optimization and system agility. Since transformational leadership, by its very nature, fosters innovation, Prajogo and Sohal (2006) have emphasized the importance of transformational leadership in the supply chain. They also stated that it improves innovation and creativity.

Transactional leadership guarantees the effective control of the process by using reward and punishment as tools to achieve the set goals. Burns (1978) defined transactional leadership as the establishment of a goal and change relationship between leaders and followers. Pagell and Wu (2009), this relationship is known to increase efficiency and effectiveness in supply chain processes in various areas, including performance monitoring and standardization. In short, it can be said that the transactional leadership approach helps to minimize errors in the supply chain, makes the processes more predictable, and increases the operational efficiency of the supply chain.

The concept of supply chain leadership therefore highlights transformational and transactional leadership styles, which are directly related to the strategic advantages and operational excellence that these approaches provide in supply chain management. Much research framing supply chain management practices is grounded in leadership theory. Research has emphasized the need for managers to exhibit both transformational and transactional leadership skills (Bass, 1990). While transactional leadership strongly influences the fair distribution of outcomes, transformational leadership significantly impacts fairness in decision-making processes. Furthermore, both leadership styles are among the key factors that determine followers' confidence in their ability to drive change.

One kind of traditional leadership that emphasizes the changes that occur between leaders and followers is called transactional leadership. These mechanisms allow leaders to meet performance targets, complete tasks, uphold organizational standards, motivate followers through agreements, ensure that followers align their behavior with organizational goals (Nugraha et al., 2019; Sánchez et al., 2020).

The main reason why transformational and transactional leadership styles come to mind when it comes to supply chain leadership is the comprehensive and effective solutions that these leadership approaches provide in supply chain management. Transformational leadership is visionary and innovative, motivating employees and fostering a culture of continuous improvement. This leadership style is defined by Bass (1985) as "a process by which a leader encourages followers to perform at a higher level and supports their personal development".

The capacity to sway another organization's behavior is the essence of leadership in a supply chain. The organization that recognizes a need for change and develops a vision of a better future that serves as a focal point for all supply chain participants is known as the supply chain leader. According to the transformational leadership philosophy, supply chain leaders should be judged on their transformational as opposed to transactional actions. Supply chain leaders ought to (a) perform at their best when they exhibit more transformative behaviors. (b) inspire followers to set shared objectives; (c) forge relationships that inspire (Defee, 2007).

1.2.The effects of transactional leadership and transformational leadership on supply chain practices

Supply chain management has emerged as a critical area for businesses to increase their effectiveness and gain competitive advantage. Transactional and transformational leadership concepts, which are important leadership approaches, offer different perspectives on supply chain management and affect practices in different ways.

With the transactional leadership method, leaders use a system of incentives and penalties to assist their followers in achieving specific objectives. The literature on the effect of the transactional leadership approach on the oversight of supply chains includes the following ideas.

- Standardization and Efficiency: Transactional leaders try to encourage standardization and sustainability of processes. Thus, they help to increase operational efficiency in supply chain management. Wisner, et al. (2021) stated that standardized processes in the supply chain reduce the error rate and accelerate the supply chain.

- Performance Tracking and Reporting: Transactional leaders establish performance measurement and reporting systems. Pagell and Wu (2009) emphasized that performance measurement systems play a critical role in the effective management of supply chain processes. Thus, with these systems, the performance of each stage in the supply chain can be monitored and it becomes easier to identify areas for improvement.

- Risk Management: Transactional leaders focus on minimizing risks. The implementation of standardized procedures and controls in supply chain processes helps to identify and mitigate risks in advance. Tang (2006) states in his study that supply chain risk management is critical for the sustainability and operational continuity of businesses.

Transformational leadership is a leadership style that encourages change and innovation. These leaders are known for their visionary approach and inspirational leadership qualities (Clifford et al., 2010). Transformational leadership affects supply chain integration in supplier, customer, and internal integration. Transformational leadership is necessary for the production process to integrate supply chain partners through the use of cutting-edge technology. Transformational leaders exude charm when they can establish trust and encourage cooperation among supply chain partners. When trust exists, a connection can be more robust and endure longer. When a company's leadership places a high priority on optimizing integration with suppliers and consumers, market responsiveness will increase (Setiabudiet al., 2021).

The effects of transformational leadership in supply chain management have been supported by academic research:

- Innovation and Continuous Improvement: Transformational leaders encourage their employees to generate innovative ideas and continuous improvement. This leads to continuous improvement of processes and technologies in the supply chain. Prajogo and Sohal (2006) emphasize the positive impact of transformational leadership on innovation, which is reflected in supply chain performance.

- Flexibility and Adaptation: Transformational leaders encourage rapid adaptation to changing market conditions and customer demands. This makes the supply chain more flexible and adaptable. Christopher and Towill (2000) stated that flexible supply chain strategies increase the ability to respond quickly to changing demands.

- Motivation and Cooperation: Transformational leaders create high-performance teams by increasing employee motivation. This leads to a higher level of cooperation and coordination in supply chain processes. Bass and Riggio (2006) detailed the positive effects of transformational leadership on employee motivation and team collaboration.

In many organizations, putting transformational leadership practices into practice is crucial to the execution of a strategy. The transformational leadership style fosters participative features, supportive, integrative leader-follower connections, and delegation in organizations, all of which facilitate the implementation of supply chain strategy. (Langton and Mafini, 2023). Organizations that want to attain business excellence might benefit from leadership. Leadership has the power to motivate companies to collaborate with their suppliers to give their clients the best possible service. However, not all senior management would see the value of working together with their suppliers; some would prefer to maintain a business-to-business relationship. Leaders who recognize the value of cooperating with their suppliers will

foster a cooperative culture in their supplier relationships. In addition, they would commit to a long term partnership with their suppliers to obtain beneficial engagement from them (Wong A., 2001).

As a result, supported studies in the literature have stated that leadership has a positive effect on supply chain management practices. Thus, the following hypotheses are proposed:

H1. Transformational leadership has a positive and direct effect on strategic supplier partnership

H2. Transactional leadership has a positive and direct effect on strategic supplier partnership

H3. Transformational leadership has a positive and direct effect on customer relationships.

H4. Transactional leadership has a positive and direct effect on customer relationships.

H5. Transformational leadership has a positive and direct effect on the quality of information sharing

H6. Transactional leadership has a positive and direct effect on the quality of information sharing

2. RESEARCH METHOD

In the first stage of this study, 4PL service providers were identified through a content analysis of the websites of logistics companies registered in the databases of UTİKAD (International Transport and Logistics Service Providers Association) and UND (International Transporters Association). Using the classification criteria developed by Saglietto (2013), a total of 48 companies were classified as 4PL service providers. The content analysis revealed that the majority of these 48 companies offer not only transportation and warehousing management services but also supply chain management, supply chain consulting, and supply chain technology solutions. More than half of these companies are established with foreign capital, and most have been operating for 60 years or longer.

In the second stage of the study, a survey method was employed to collect data from the 48 companies identified in the first stage. Only one respondent from each company was contacted, typically a supply chain manager or operations manager. As a result of the data collection process, responses were obtained from managers in 33 companies. Due to the limited number of 4PL service providers and the difficulties in accessing them, the snowball sampling method was preferred. Snowball sampling is a non-probability sampling technique that enables researchers to reach additional participants through referrals from initially contacted individuals, particularly in cases where the target population is difficult to access collection process to be carried out more efficiently (Taherdoost, 2016).

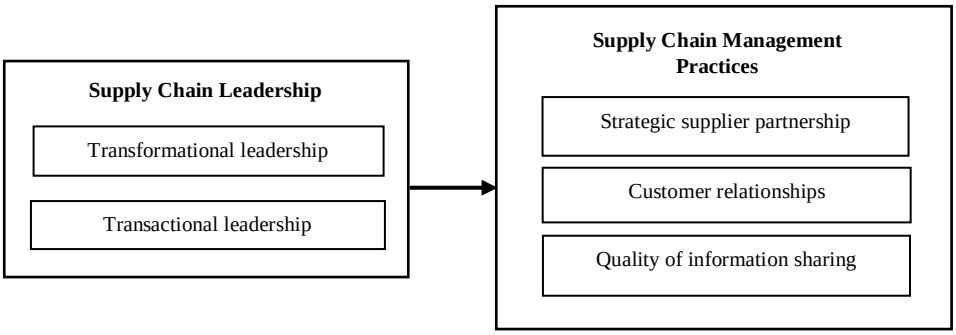

Figure 1: Research Model and Hypotheses

The research model predicts that supply chain management procedures will be impacted by leadership. Practices in supply chain management are regarded as three dimensional structures. While there are two

types of leadership, transformational and transactional, supply chain management practices have three dimensions: strategic supplier partnerships, customer relationships, and the quality of information sharing (Figure 1).

Table 1: Variables of the study

Demographic information of the firm
1. The duration of operation
2. The structure of partnerships
3. The quantity of workers
4. Respondent's title
Variables related to organizational leadership of respondents manager; My manager;
1. Makes employees feel good about themselves.
2. Treats his/her employees in a way that makes us respect him/her.
3. Makes me proud to work with him/her.
4. Makes employees feel that he/she believes that they will achieve their goals.
5. Can create a strong common purpose using symbols and slogans.
6. Enables employees to see striking situations about the future.
7. Allows us to look at the way things are done and existing problems with new perspectives.
8. Provides the necessary environment and conditions for employees to share their views on differences in the work environment.
9. Seeks different approaches to solving problems.
10. Helps me to develop my strengths.
11. Evaluates me as an individual with different needs, abilities and desires than others.
12. Makes an effort to observe his/her employees one to one.
13. Clearly states what I will get in return when I achieve the performance objectives.
14. Expresses satisfaction with me when I fulfill the objectives expected of me.
15. Specifies in detail who is responsible for me in the process of achieving the performance objectives.
Variables related to supply chain management practices of respondents' firm's present conditions.
16. When choosing suppliers, we place the highest priority on quality.
17. Our suppliers and I frequently work together to resolve issues.
18. We have contributed to the enhancement of our suppliers' service standards.
19. We work with our primary suppliers on going improvement projects.
20. We involve our primary suppliers in the formulation of our plans and objectives.
21. We actively participate in the development of new services with our primary suppliers.
22. We communicate with consumers often to establish expectations for responsiveness, dependability, and other factors.
23. We monitor and assess customer satisfaction on a regular basis.
24. We regularly as certain the future aspirations of our clients.
25. We frequently stress the value of our relationships with our clients.
26. We notify our business associates a head of time of any changes in demands.
27. In order to plan our company, we share information with our business partners.
28. We give our business partners accurate information.

Three primary variable groups were employed in this investigation. We asked respondents in the first phase of the survey to respond to questions about the demographics of both the firms and the respondents.

Ohja et al. (2018) contextual dimensions were included in the survey's second section to assess leadership. In the final and third sections of the survey, we asked the participants to reply to questions about supply chain management techniques. The questions were created after a thorough review of the relevant literature (Li et al., 2006). Table 1 provides a summary of the study's variables.

3. RESULTS

We offer the findings from the analysis of the proposed models in this section. We draw attention to the respondent profile and confirmatory factor analysis, which are defined below. Following that, we offer some managerial perspectives.

3.1. The profile of responder companies

The 33 4PL service providers participating in the survey show considerable variation in their years of operation. The majority of the service providers (61%) have been operating for 0-40 years, 1 provider (3%) for 41-80 years, 7 providers (21%) for 81-120 years, and 5 providers (15%) for more than 120 years. In terms of ownership structure, most service providers (64%) are fully foreign-owned, 9% have a majority foreign ownership, and 27% are entirely domestically owned. The respondents hold a variety of positions, primarily operations managers, team/transport leaders, specialists/analysts, and customer service or logistics project managers, reflecting the diverse managerial responsibilities and multi-level organizational structure within 4PL service providers.

3.2. Confirmatory Factor Analysis

SmartPLS is used to analyze the indicator reliability, internal consistency (composite reliability), discriminant validity, convergent validity, and indicator reliability of our PLS-SEM model. The internal consistency dependability of Partial Least Squares Path Analysis(PLS-SEM) measurement models is assessed before other considerations. The degree to which different items measure the same thing is known as homogeneity or internal consistency (Davenport et al., 2015). For internal consistency, Cronbach alpha and composite reliability (CR) values are examined. Each factor's Cronbach's alpha value ranged from 0.792 to 0.956. Comparable to Cronbach's alpha, it is a distinct metric whose composite reliability values range from 0.865 to 0.961. Reliability for internal consistency is so stated to be offered. The convergent validity is obtained when all items in a measuring model are statistically significant. This validity could also be checked by Average Variance Extracted (AVE) and items' factor loadings (Ahmad et al., 2016). Furthermore, each indicator (item on the scale) should have factor loadings higher than 0.60 and AVE values greater than 0.50 (Hair et al., 2014). The AVE values fell within the significant support range of 0.620 to 0.859, indicating convergent validity. The range of the factor loadings was 0.649 to 0.941. (Table 2).

Table 2: Factor loadings, Cronbach's α, composite reliability and AVE values of the scale

Item	FactorL	Cronbach'sα	CR	AVE
TransformationalLeadership				
TF1	0,848	*0,956*	*0,961*	*0,675*
TF2	0,838			
TF3	0,725			
TF4	0,860			
TF5	0,813			
TF6	0,894			
TF7	0,888			
TF8	0,664			
TF9	0,860			
TF10	0,867			

TF11	0,793			
TF12	0,777			
TransactionalLeadership				
TC1	0,927	*0,918*	*0,948*	*0,859*
TC2	0,940			
TC3	0,912			
Strategic SupplierPartnership				*0,670*
SP1	0,855	*0,900*	*0,924*	
SP2	0,687			
SP3	0,851			
SP4	0,895			
SP5	0,814			
SP6	0,794			
CustomerRelationship				
CR1	0,877	*0,887*	*0,930*	*0,815*
CR2	0,901			
CR3	0,900			
Quality of Information Sharing				
IT1	0,894	*0,792*	*0,864*	*0,620*
IT2	0,649			
IT3	0,897			
IT4	0,673			

Based on the proposed model, a series of multiple regression analyses were used to determine the path coefficients. The results obtained are shown in Figure 2.

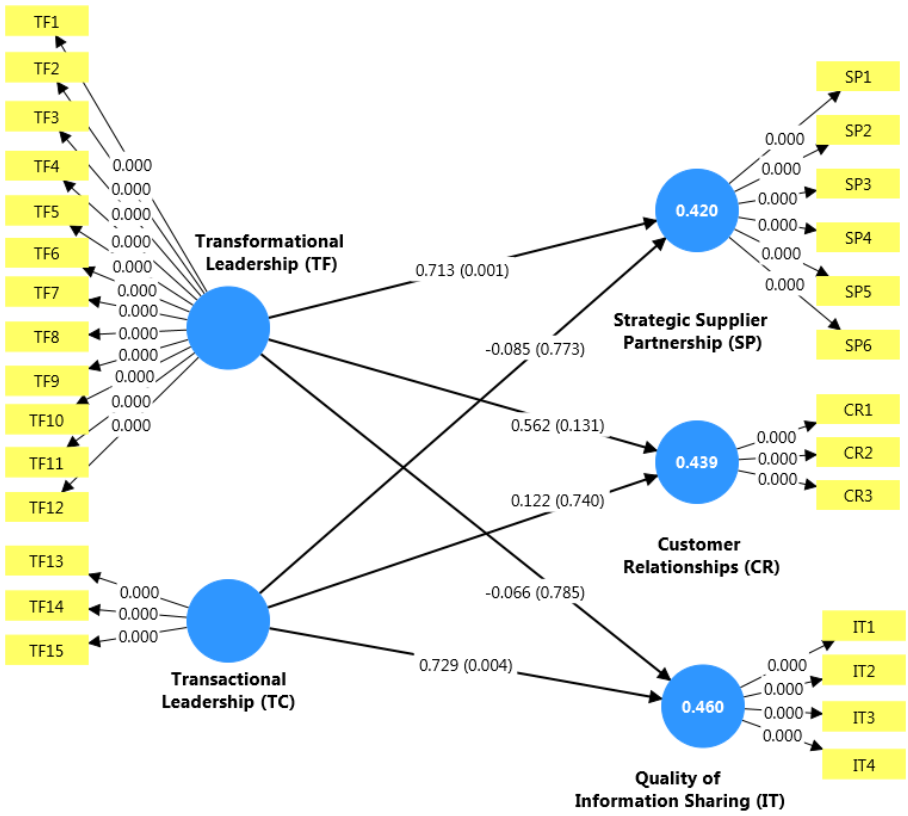

Figure 2: The path model of this study

The research model was examined using PLS-SEM. The analysis was conducted in SmartPLS 4 (Ringle et al., 2024; Yıldız, 2024). The PLS algorithm was applied to determine linear relationships, path coefficients, R^2 values, and effect sizes (f^2) within the model. To test the significance of the path coefficients, bootstrapping with 10,000 subsamples was performed. The VIF, R^2, Q^2, and f^2 results for the model are summarized in Table 3.

Table 3. Coefficients of the research model

Variables		R^2	f^2	Q^2	VIF
Transactional Leadership	**Customer relationship**	0,442	0,013	0,203	2,613
Transformational Leadership			0,208		
Transactional Leadership	**Quality of Information Sharing**	0,462	0,375	0,358	
Transformational Leadership			0,003		
Transactional Leadership	**Strategic Supplier Partnership**	0,412	0,003	0,220	
Transformational Leadership			0,309		

When examining the VIF (Variance Inflation Factor) values between variables, it is seen that the VIF value is 2.613. Since this value is below 5, which is accepted as the threshold value, it is understood that there is no linearity (multicollinearity) problem between the variables (Hair et al., 2022).

The R^2 values obtained for the model indicate that the Quality of Information Sharing explains 46,2 %, and Strategic Supplier Partnership explains 41,2 %. According to Chin (1998), R^2 values above 0.67 indicate

strong explanatory power, values between 0.33 and 0.67 indicate moderate explanatory power, values between 0.19 and 0.33 indicate weak explanatory power, and values below 0.19 are considered unacceptable. In the present study, the R^2 values were 0.462 for Quality of Information Sharing, and 0.412 for Strategic Supplier Partnership, indicating a moderate level of explanatory power. However, the conditions of the research discipline should not be ignored when evaluating R^2 coefficients. For example, while R^2 coefficients of 0.75 and above are considered strong in the discipline of marketing, R^2 coefficients of 0.50 and above can be interpreted as strong in the discipline of organizational behavior (Yıldız, 2024).

According to Cohen (1988), effect size (f^2) values of 0.02 or higher are considered small, 0.15 or higher medium, and 0.35 or higher large. Sarstedt et al. (2017) also note that when f^2 values are below 0.02, no meaningful effect can be assumed. Examination of the effect size coefficients (f^2) shows that Transactional Leadership has a large effect on Quality of Information Sharing, whereas Transformational Leadership has a medium effect on Strategic Supplier Partnership.

Based on Henseler et al. (2015), discriminant validity in variance-based SEM was assessed using the heterotrait–monotrait (HTMT) ratio. In this study, the cutoff value was set at 0.90. All HTMT values presented in Table 4 fall below this threshold. This result indicates that discriminant validity has been established.

Table 4:Heterotrait-monotrait ratio of correlations (HTMTs) for checking discriminant validity

	Customer Relationship	Quality of Information Sharing	Strategic Supplier Partnership	Transactional Leadership
Quality of Information Sharing	0.728			
Strategic Supplier Partnership	0.701	0.581		
Transactional Leadership	0.606	0.760	0.511	
Transformational Leadership	0.703	0.550	0.666	0.814

3.3. Hypothesis Testing

Hypotheses corresponding to paths whose bootstrap confidence intervals indicated in the Table 5. as 95% Confidence Interval (CI % 95) did not include zero were considered supported. We find a significant and positive impact of transformational leadership on customer relationship and strategic supplier partnership. We also find a significant and positive impact of transactional leadership on the quality of information sharing.

Table 5. Significance testing results of the structural model path coefficients for direct effect

Variables		β	Standard Deviation	t statistic	p-value	CI (%95)
Transactional Leadership	**Customer Relationship**	0,122	0,367	0,415	0,740	-0,427; 0,914
Transformational Leadership		0,562	0,372	1,538	0,131	-0,286; 1,067
Transactional Leadership	**Quality of Information Sharing**	0,729	0,255	2,904	*0,004*	0,093; 1,120
Transformational Leadership		-0,066	0,243	0,264	0,785	-0,523; 0,416
Transactional Leadership	**Strategic Supplier Partnership**	-0,085	0,296	0,290	0,773	-0,774; 0,417
Transformational Leadership		0,713	0,219	3,229	*0,001*	0,158; 1,093

Hypotheses were tested using SmartPLS 4 based on standardized path coefficients and p-values, and the results are presented in Tables IV and V. The findings provide support for H1 (β: 0,713; p<0,05) and H6 (β: 0,729; p<0,05) Although the p-value for the relationship between transformational leadership and customer relationship management was found to be 0.131, which is slightly above the conventional significance threshold of 0.05, the result may be interpreted as marginally significant. In management and social science research, significance levels of $p < 0.10$ are sometimes considered acceptable, particularly in exploratory studies (Hair et al., 2019). Therefore, the findings suggest a potential positive relationship between transformational leadership and customer relationship management, which may become more evident in studies with larger samples.(Table 5). The estimated model reports an Standardized Root Mean Square Residual (SRMR) value of 0.127.

4. FINDINGS AND DISCUSSION RECOMMENDATIONS

The findings of this study indicate that leadership styles in 4PL service providers have significant effects on various dimensions of supply chain management practices. Since 4PL service providers coordinate multiple logistics actors and manage complex supply chain networks, their leadership approaches play a critical role in the effective management of these networks.

According to research findings, transactional leadership has a positive effect on the quality of information sharing in the supply chain. Transactional leadership is a leadership approach based on monitoring performance, maintaining standards, and establishing formal reporting mechanisms (Bass, 1985). These characteristics can ensure that information flows regularly and reliably, especially in supply chain environments where operational processes are intensive. Therefore, it is recommended that 4PL managers prefer transactional leadership behaviors, especially in situations where operational coordination, process control, and information accuracy are critical. Standardized information flow in processes such as demand forecasting, inventory coordination, shipment tracking, and performance reporting improves supply chain performance. Indeed, the literature indicates that the quality of information sharing improves supply chain coordination and reduces uncertainty (Li et al., 2006; Flynn et al., 2010). In this context, the transactional leadership approach can improve the quality of information sharing by supporting the establishment of standardized communication mechanisms among supply chain actors.

Another important finding of the study is that transformational leadership has a significant impact on strategic supplier partnerships. Transformational leaders demonstrate leadership behaviors that motivate stakeholders by creating a shared vision and promoting trust and cooperation (Bass and Riggio, 2006). Strategic supplier relationships in supply chains are considered not merely operational relationships, but strategic partnerships requiring long-term cooperation and mutual trust. Therefore, it is recommended that 4PL managers adopt a transformational leadership approach, particularly in situations where long-term cooperation needs to be developed, strategic alignment with suppliers needs to be achieved, and shared value needs to be created. The literature also emphasizes that strategic supplier partnerships improve supply chain performance and support the establishment of trust-based relationships between companies (Chen and Paulraj, 2004; Mentzer et al., 2001). Transformational leaders can contribute to the development of stronger coordination and joint problem-solving mechanisms among supply chain actors by encouraging collaboration.

The findings of this study also provide important insights into how information sharing in the supply chain should be designed and structured. The research results show that high quality information sharing can only become sustainable when supported by standardized systems and performance measurement mechanisms. Therefore, it is recommended that 4PL service providers establish integrated information systems, standardized reporting mechanisms, and transparent communication channels to improve information sharing throughout the supply chain. Studies by Flynn et al. (2010) and Li et al. (2006) also show that effective information sharing strengthens supply chain integration and improves operational performance.

However, Strategic Supplier Partnership relationships must be designed not only as transaction based relationships but also as structures based on long term cooperation. For the development of such partnerships, it is important to establish mutual trust, common performance goals, and cooperation-based decision-making mechanisms. Chen and Paulraj (2004) state that strategic supplier partnerships are characterized by long-term orientation, mutual trust, and intensive information sharing. Similarly, Mentzer et al. (2001) emphasize that effective supply chain relationships require collaboration and coordination. In this regard, 4PL managers developing trust-based relationships with suppliers, establishing joint planning processes, and encouraging open communication will increase the success of strategic supplier partnerships.

Overall, the results of this study highlight the importance of 4PL managers adopting a situational leadership approach. While transactional leadership is more effective in situations requiring standardization and control in operational processes, transformational leadership emerges as a more appropriate approach in situations where long-term collaborations need to be developed and strategic relationships strengthened. Using these two leadership styles together and according to the situation can increase both the operational efficiency and supply chain integration of 4PL service providers.

The findings of this study indicate that although the effect value between transformational leadership and customer relationship outcomes is slightly above the traditional significance threshold ($p < 0.05$), the result can be interpreted as marginally significant. This finding is supported by other studies in the literature. In particular, Budur and Poturak (2021) found that transformational leadership behaviors positively affect customer satisfaction through organizational citizenship behaviors. Similarly, Abeysekera and Jayakody (2012) noted that transformational leadership is positively related to relationship marketing outcomes and can strengthen customer relationships in competitive environments. These findings support the idea that transformational leadership can increase customer-focused behaviors within the organization and thus improve customer relationship management (CRM) outcomes.

This study has certain limitations. First, the research was conducted with a limited sample due to time and cost constraints. Furthermore, the fact that the 4PL service providers in the sample were spread across different regions of Turkey complicated the data collection process. In addition, the reluctance of some companies to participate in the research is also among the limitations of the study.

For future studies, it may be advisable to examine the relationship between supply chain leadership and supply chain agility in greater depth. In particular, examining the effects of both transactional and transformational leadership approaches on supply chain performance and agility could make significant contributions to the literature.

Author Statement

Ethics Statement: The authors declare that ethical rules were followed in all preparation processes of this study. In case of detection of a contrary situation, all responsibility belongs to the authors.

Declaration of generative AI (If any): The authors acknowledge the use of DeepL (Deep Learning) Translator to correct language, improve academic expressions and enhance methodological clarity. All outputs generated were subsequently reviewed and appropriately revised by the authors, who take full responsibility for the final content of the published work.

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