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The Influence of Order Complexity and Logistics System Capability on Task-Technology Fit and Fulfillment Center Logistics System Capability: A Study on E-Commerce Fulfillment Centers

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Abstract: This study explores how the complexity of customer orders and the strength of logistics systems impact service quality in E-Commerce fulfillment centers, using the Task-Technology Fit (TTF) model as a framework. The research focuses on E-Commerce companies in the Jabodetabek area, gathering data from 200 employees through a quantitative method using SEM-PLS. Results show that while complex orders can improve the alignment between tasks and technology, they may reduce logistics system effectiveness. However, strong logistics capabilities enhance both TTF and service quality. The study highlights TTF as a key factor linking logistics performance to service outcomes. These findings offer both theoretical insights into the TTF model and practical guidance for E-Commerce businesses aiming to improve service efficiency by better aligning technology, logistics, and task demands.

Keyword: Order Complexity, Logistics Capability, Task-Technology Fit, Fulfillment Center.

INTRODUCTION

The rapid growth of E-Commerce has driven companies to make major changes to their supply chain systems, especially in fulfillment Centers as order processing and delivery Centers (Yang, 2023). The increase in transaction volume and customer demands for fast delivery pose challenges in operational management (Tang & Wang, 2020). To maintain service quality, companies need to manage Order Complexity and maximize logistics capabilities (Karia & Kays, 2020). This challenge also concerns the fit between technology and the tasks being performed. The Task-Technology Fit approach (Goodhue & Thompson, 1995) is used to assess the effectiveness of technology in supporting tasks. This study examines the effect of Order Complexity and Logistics System Capability on Fulfillment Center Logistics System Capability with TTF as a mediating variable.

Increasing Order Complexity in the modern supply chain is a significant challenge for companies in today's digital era. Rapid changes in consumption patterns and increasing customer expectations for fast and accurate service have pushed companies to adapt to

changing needs (Tang & Wang, 2020). In addition, the rapid development of E-Commerce has created an increasingly complex Fulfillment system, where companies must be able to manage various types of orders and meet customer demand efficiently (Yang, 2023). These findings indicate that strengthening the logistics system is a strategic step that companies need to take to remain competitive in the face of evolving market dynamics, where speed and accuracy in fulfilling orders are the keys to success (Delima et al., 2018).

Logistics plays a key role in order fulfillment, where an effective logistics system can improve operational efficiency and customer satisfaction (Permana & Setianto, 2017). The capability of a logistics system to handle order variations is very important, especially in the context of E-Commerce which often involves large volumes of deliveries and short lead times (Schrier et al., 2010). Research shows that a well-integrated logistics system not only improves efficiency but also allows companies to respond to changes in demand more quickly, thereby increasing competitiveness in the market (Musyaffi & Muna, 2020). Therefore, investing in the right logistics technology and developing a system that is responsive to customer needs is very important to achieve success in order fulfillment (Dare-Abel, 2014).

Maintaining a balance between the tasks involved in order fulfillment and the technology used to support them is essential. Task-Technology Fit (TTF) framework is useful for evaluating how well the technology in a Fulfillment Center aligns with and supports operational tasks (Gebauer et al., 2010). TTF helps identify the use of technology that is in accordance with operational needs, thereby improving customer service and satisfaction (Mikalef et al., 2019). The implementation of TTF has been shown to drive significant improvements in operational performance and user experience (Dzikria & Solihin, 2023). Therefore, companies need to make TTF part of their strategy to develop an efficient and adaptive fulfillment system (Hester, 2013).

Managing orders with high complexity presents major challenges, especially related to the variety of sizes, types, and urgency of orders. This condition makes it difficult for fulfillment centers to manage logistics capacity efficiently, especially if the system used is not flexible and adaptive (Umar & Wilson, 2023). The mismatch between tasks and technology can reduce operational efficiency and customer satisfaction (Avriani et al., 2024). Previous studies have not integrated Order Complexity, logistics capabilities, and Service Level in the Task-Technology Fit framework (Yuste et al., 2019; Zhang et al., 2019), so further studies are needed.

The main problem in this study is the suboptimal understanding of how order complexity and logistics system capability simultaneously affect the level of service (Logistics System Capability) through the fit between tasks and technology (Task-Technology Fit/TTF), especially in the Fulfillment Center environment operating in a dynamic E-Commerce ecosystem. The mismatch between technology and operational needs risks reducing service efficiency, especially when facing high order variations. In addition, there is still a gap in research that integrates the three variables in a comprehensive conceptual framework. The main contribution of this study is the creation of a theoretical framework that highlights Task-Technology Fit (TTF) as a mediator between order complexity and logistics system capability, which in turn impacts service quality. Practically, this study provides strategic implications for E-Commerce companies in managing logistics systems and technology in an integrated manner to respond to order complexity more adaptively and efficiently.

Ramdani et al. (2025) highlighted that the characteristics of tasks and the functionality of supporting technologies are key in determining Task-Technology Fit (TTF), which directly influences service quality within Fulfillment Centers. However, their study did not specifically explore how operational factors like Order Complexity and Logistics System Capability impact service performance. In reality, both elements play a crucial role in ensuring accuracy and speed in the order fulfillment process—an increasingly important concern as E-Commerce operations

face greater pressure and demand (Luna, 2015). Based on this, this study was developed by replacing the previous variables with Order Complexity and Logistics System Capability and adding an analysis of the direct influence on Fulfillment Center Logistics System Capability. The aim is to provide a broader and more practical perspective in understanding efforts to improve service performance in a dynamic Fulfillment Center environment.

This research seeks to examine how order complexity and logistics system capability contribute to enhancing services in Fulfillment Centers, while also examining how Task-Technology Fit (TTF) acts as a bridge in the relationship between these variables. Order complexity, such as the variety of sizes, types, and urgency, can affect logistics effectiveness. Previous studies have suggested that logistics capability has a positive impact on service, while TTF bridges order complexity and logistics systems. This study provides practical insights for fulfillment Center managers to optimize technology and logistics to improve service efficiency and customer satisfaction in the logistics industry.

LITERATURE REVIEW

Research by Gils et al. (Gils et al., 2019) shows that complexity in order management can affect the fit of technology to the task at hand. In the context of warehouse operations, high complexity in order picking often requires more sophisticated technology to support efficiency and effectiveness. This finding is in line with the results of Butt et al. (2021), which states that the fit between the technology used and the complexity of the task at hand allows users to complete work more efficiently, thereby encouraging an increase in the level of Task-Technology Fit (TTF). Thus, higher Order Complexity can encourage users to seek more appropriate technology, which in turn increases TTF.

H1: Order Complexity positively influences Task-Technology Fit

In relation to logistics system capability, Hsu and Tseng (2022) found that strong technological capabilities within a logistics system can enhance the alignment between technology and the tasks it supports. Their study indicates that when a logistics system is highly capable, users are better able to adapt and apply technology effectively to their work, resulting in improved Task-Technology Fit (TTF). In addition, research by Karia and Kays Karia & Kays (2020) emphasized that good logistics capability can facilitate more effective use of technology, which also contributes to increased TTF. Therefore, higher Logistics System Capability has the potential to significantly improve TTF.

H2: Logistics System Capability positively influences Task-Technology Fit

Butt et al. (2021) demonstrated that Task-Technology Fit (TTF) significantly improves service performance. They highlighted that the fit between technology and the task at hand allows users to achieve more optimal work results in the service context. Support for this finding also comes from the findings of Wu and Tian (2021), who stated that TTF not only encourages the intention to continue using the system but also contributes directly to improving service performance. Therefore, a high level of TTF can be a key factor in driving overall improvements to Service Level Performance.

H3: Task-Technology Fit positively influences Service Level Performance.

Order Complexity can negatively affect Service Level Performance, as indicated by research by Gils et al. (Gils et al., 2019). This study shows that the more complex an order is, the more difficult it is to meet the expected service level, because complexity can cause delays and errors in delivery. In addition, Karia Karia (2022) emphasized that complexity in the logistics process can disrupt operational efficiency, which in turn can reduce service performance. Therefore, high Order Complexity can result in decreased Service Level Performance.

H4: Order Complexity negatively impacts Service Level Performance.

Research by Karia and Kays (2020) shows that Logistics System Capability positively affects Service Level Performance. This study revealed that good logistics capabilities can improve efficiency and effectiveness in supply chain management, which contributes to improved service performance. In addition, research by Hsu and Tseng Hsu & Tseng (2022) showed that a strong logistics system can better meet customer needs, thereby improving Service Level Performance. Purnomo et al. (2024) stated that green transformational leadership implemented by managers can strengthen the resilience of a sustainable supply chain, with the moderating impact of green ambidexterity and green innovation, which play an important role in improving logistics system capabilities. Therefore, strong Logistics System Capability can greatly enhance service performance.

H5: Logistics System Capability positively influences Service Level Performance

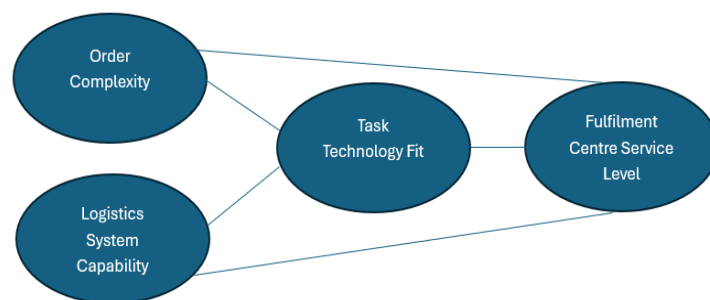
Task-Technology Fit (TTF) serves as a mediator between order complexity and service level performance. According to Butt et al. (2021), TTF can shape the way order complexity affects overall service outcomes. As task complexity increases, good TTF can help users to be more effective in using technology, thereby reducing the negative impact of complexity on service performance. Furthermore, Wu and Tian (2021) found that TTF can enhance the connection between order complexity and service level performance, underscoring the importance of aligning technology with tasks in complex operational settings.

H6: Task-Technology Fit acts as a mediator between Order Complexity and Service Level Performance.

TTF also serves as a mediator between Logistics System Capability and Service Level Performance. Research by Hsu and Tseng Hsu & Tseng (2022) shows that good logistics system capability can increase TTF, which in turn contributes to improved service performance. In addition, research by Karia and Kays Karia & Kays (2020) emphasizes that when TTF is high, users can be more effective in utilizing logistics capabilities, thereby improving Service Level Performance. According to Purnomo et al. (2024), the use of XGBoost-based regression methods to predict regional best prices for logistics services can help companies optimize their logistics systems, which in turn can improve the efficiency and quality of service in E-Commerce fulfillment Centers. Thus, TTF plays an important role in linking Logistics System Capability to service performance.

H7: Task-Technology Fit mediates the impact of Logistics System Capability on Service Level Performance.

Figure 1 Research Model



METHOD

This research method will use a quantitative approach with a survey design to test the hypotheses that have been formulated. The population in this study is an E-Commerce startup company operating in the Jabodetabek area, which is one of the business and technology Centers in Indonesia. The sample will be taken purposively, with the criteria that the company must have experience in using information technology to support logistics operations and customer service. By applying this sampling technique, it is expected to obtain relevant and

representative data for further analysis. The expected number of samples is around 200 respondents from various positions in the company, including logistics managers, IT managers, and operational staff.

After completing data collection, the analysis will be conducted using the SEM-PLS method, chosen for its ability to handle complex models and analyze multiple variable relationships efficiently. This method will examine how Order Complexity and Logistics System Capability Influence Task-Technology Fit (TTF), and how TTF impacts overall logistics performance. It also explores TTF’s mediating role in the relationships between Order Complexity and Logistics System Capability Performance, as well as between logistics capability and its outcomes. The goal is to gain a deeper understanding of these dynamics in E-Commerce and generate insights to support better operational and technology strategies.

This study uses SEM-PLS analysis to examine how order complexity and logistics system capability influence Task-Technology Fit (TTF) and overall logistics performance. It also explores TTF’s role as a mediator between task complexity, logistics capability, and service quality. The research aims to expand the TTF framework and offer practical guidance for E-Commerce companies, especially in selecting suitable technologies and managing complex operations. Additionally, it addresses a gap in current studies by focusing on how these factors impact service performance in Indonesia’s E-Commerce industry, offering insights that can help improve service strategies and efficiency.

RESULT AND DISCUSSION

Outer Model or Measurement Model Analysis

Table 1. Outer Loadings (Measurement Model)

	Fulfillment Center Service Level	Logistics System Capability	Order Complexity	Task-Technology Fit
FCSL1	0.970			
FCSL2	0.988			
FCSL3	0.972			
FCSL4	0.928			
FCSL5	0.960			
LSC1		0.848		
LSC2		0.859		
LSC3		0.817		
LSC4		0.821		
LSC5		0.811		
LSC6		0.810		
OC1			0.889	
OC2			0.896	
OC3			0.774	
OC4			0.780	
OC5			0.746	
TTF1				0.959
TTF2				0.953
TTF3				0.927
TTF4				0.946

Source: 2025 Questionnaire Processing Data

The analysis indicates that most indicators meet the required thresholds, meaning they effectively represent their respective latent variables. This indicates that the research model’s

constructs show convergent validity because the indicators are closely connected and reliably measure the same core concept.

Evaluate Reliability and Average Variance Extracted (AVE)

Table 2. Composite Reliability and AVE

	Cronbach's Alpha	Rho A	Composite Reliability	Average Variance Extracted (AVE)
Fulfillment Center Logistics System Capability	0.981	0.982	0.985	0.929
Logistics System Capability	0.926	0.996	0.929	0.686
Order Complexity	0.897	0.974	0.910	0.671
Task-Technology Fit	0.961	0.962	0.972	0.896

Source: 2025 Questionnaire Processing Data

Referring to Table 2, it can be concluded that all constructs, namely Fulfillment Center Logistics System Capability, Logistics System Capability, Order Complexity, and Task-Technology Fit have met the reliability standards. This can be seen from the fulfillment of all reliability assessment criteria, both based on the rho_A value, Cronbach's Alpha, Composite Reliability, and AVE.

Structural Model Testing (Inner Model)

Testing Goodness Of Fit Model

Table 3. R-Square Value

	R Square	Adjusted R Square
Fulfillment Center Logistics System Capability	0.923	0.922
Task-Technology Fit	0.758	0.755

Source: 2025 Questionnaire Processing Data

Table 3 reveals that the R-square value for the Fulfillment Center Logistics System Capability variable is 0.923, showing that 92.3% of its variation can be explained by the combined effects of Order Complexity (X1), Logistics System Capability (X2), and Task-Technology Fit (Z). Meanwhile, the Task-Technology Fit (Z) variable has an R-square value of 0.758, indicating that 75.8% of its changes are jointly influenced by Order Complexity (X1) and Logistics System Capability (X2).

Partial Effect Hypothesis Testing (Direct Effect)

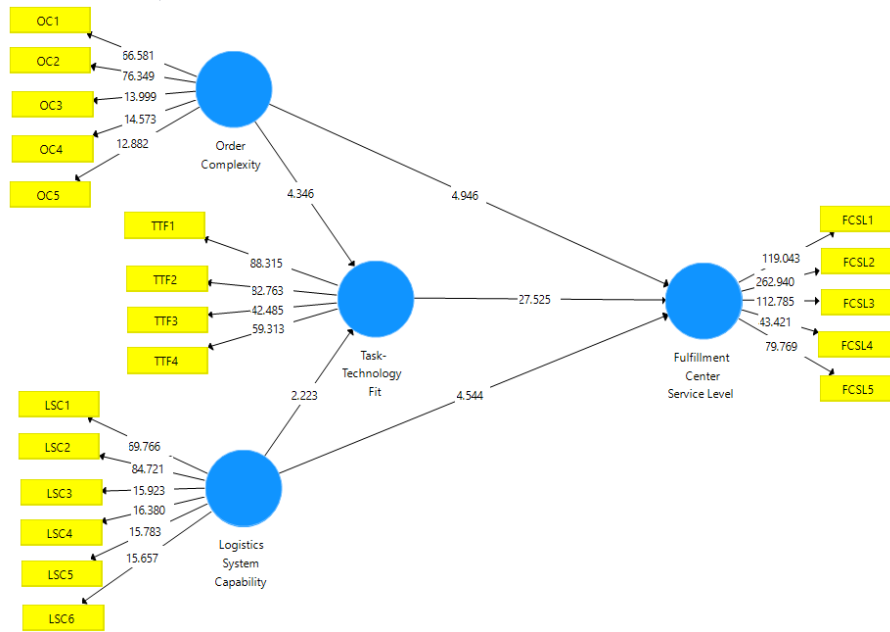


Figure 2. Estimation Output for Structural Model Testing

The following are the bootstrapping estimation results obtained through Smart-PLS, which are presented in detail in Table 4.

Table 4. Results for Inner Weights (Direct Effect)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Logistics System Capability -> Fulfillment Center Logistics System Capability	0.486	0.471	0.107	4,544	0.000
Logistics System Capability -> Task-Technology Fit	0.306	0.296	0.138	2.223	0.027
Order Complexity -> Fulfillment Center Logistics System Capability	-0.537	-0.523	0.109	4.946	0.000
Order Complexity -> Task-Technology Fit	0.579	0.593	0.133	4.346	0.000
Task-Technology Fit -> Fulfillment Center Logistics System Capability	0.995	0.995	0.036	27,525	0.000

Source: 2025 Questionnaire Processing Data

The connection between Logistics System Capability (X2) and Fulfillment Center Logistics System Capability (Z) shows a positive and statistically significant effect, with a coefficient of 0.486 and a t-value of 4.544 (p = 0.000). This means that enhancing logistics system capability directly leads to better service quality at the fulfillment center. In other words, strong logistics capabilities have a direct and positive effect on service improvement.

The relationship between Logistics System Capability (X2) and Fulfillment Center Logistics System Capability (Z) has a positive and statistically significant effect, indicated by a coefficient of 0.486 and a t-value of 4.544 (p = 0.000). This indicates that improvements in logistics system capability directly contribute to higher service quality at the fulfillment center. Simply put, stronger logistics capabilities have a clear and positive impact on enhancing service performance.

The relationship between Order Complexity (X1) and Fulfillment Center Logistics System Capability (Z) has a negative coefficient value of -0.537 at t-statistic 4.946 (p = 0.000) indicating that the more complex the order, the lower the level of fulfillment Center service. This indicates that Order Complexity is a significant obstacle in maintaining or improving service quality.

The relationship between Order Complexity (X1) and Task-Technology Fit (Y) is positive and significant, with a coefficient of 0.579 and a t-value of 4.346 (p = 0.000). This suggests that as order complexity increases, ensuring a good fit between tasks and technology becomes even more crucial, helping to effectively manage that complexity.

Meanwhile, the relationship between Task-Technology Fit (Y) and Fulfillment Center Logistics System Capability (Z) shows a very high coefficient of 0.995 with a t-statistic reaching 27.525 (p = 0.000). This finding confirms that the suitability of tasks and technology has a very strong and significant impact on improving service levels in fulfillment Centers. This indicates that this factor is the main key in achieving optimal service.

Indirect Effect Test (Mediation)

Table 5. Indirect Influence

	Original Sample (O)	Sample Mean	Standard Deviation	T Statistics (O/STDEV)	P Values
Logistics System Capability -> Task-Technology Fit -> Fulfillment Center Logistics System Capability	0.304	0.294	0.137	2.223	0.027
Order Complexity -> Task-Technology Fit -> Fulfillment Center Logistics System Capability	0.576	0.590	0.135	4.268	0.000

Source: 2025 Questionnaire Processing Data

The results show that Logistics System Capability (X2) indirectly affects Fulfillment Center Logistics System Capability (Z) via Task-Technology Fit (Y), at the influence coefficient of 0.304, with a t-statistic of 2.223 and a p-value of 0.027, these results show that the indirect effect is significant at the 95% confidence level. This means that increasing the capability of the logistics system contributes to increasing Task-Technology Fit, which in turn has a positive impact on the Fulfillment Center's service level.

Order Complexity (X1) has a significant indirect influence on Fulfillment Center Logistics System Capability (Z) through Task-Technology Fit (Y), through a coefficient of 0.576. The t-statistic value of 4.268 and the p-value of 0.000 indicate that the level of significance is very high. This indicates that although Order Complexity tends to be a challenge, the existence of Task-Technology Fit can change this challenge into an increase in the quality of Fulfillment services center.

The results indicate that Order Complexity positively and significantly affects Task-Technology Fit (TTF), with a coefficient of 0.579 and a t-value of 4.346 (p < 0.001). This confirms the H1 hypothesis and aligns with the studies by Gils et al. (2019) and Butt et al. (2021), which highlight that greater task complexity drives the need for more suitable technology to enhance work efficiency. As order complexity rises, ensuring a strong fit between technology and tasks becomes increasingly important to maintain efficient processes.

Discussion

This study offers empirical insights into how Order Complexity and Logistics System Capability influence Task-Technology Fit (TTF) and the logistics capabilities of fulfillment

centers within Indonesia's E-Commerce sector. The findings suggest that the more complex the order, the more important the fit between task and technology becomes to maintain service performance.

The positive influence of Order Complexity on TTF strengthens the arguments of Gils et al. (2019) and Butt et al. (2021) that technology that is aligned with the level of task complexity will encourage increased work efficiency. Task complexity demands an adaptable system, thus encouraging companies to evaluate and adjust their technology.

Meanwhile, Logistics System Capability has been proven to have a significant direct and indirect impact on Logistics System Capability. In line with Hsu & Tseng (2022) and Karia & Kays (2020), good logistics capability is not just about increasing operational efficiency but also strengthening the system's ability to create optimal TTF. This means that logistics is not just a supporting function, but a strategic factor in realizing resilient and responsive services.

TTF plays a central role as a mediator, strengthening the relationship between input variables (Order Complexity and Logistics Capability) and output (Logistics System Capability). High TTF enables companies to face Order Complexity and utilize logistics capabilities to the fullest. This reinforces Wu & Tian's (2021) study that the sustainability of system use is highly dependent on the fit between tasks and technology.

Interestingly, Order Complexity has a direct negative impact on Logistics System Capability, indicating that without proper system support, complexity is actually a major service barrier. However, through TTF, this negative impact can be mitigated, even turned into added value for the company. This means that technology is not just a tool, but a strategic bridge between operational challenges and service excellence.

Practical Implications

The findings highlight the need for E-Commerce management to develop operational and technological strategies that are well-integrated. In facing the increasing complexity of orders, companies need to ensure that the technology systems used are aligned with the characteristics of the tasks being carried out in order to remain adaptive and responsive to market dynamics. Strengthening the capabilities of the logistics system is not enough just through investment in sophisticated technological devices but must also be balanced with increasing human resource competencies and the integration of information systems that support business processes as a whole. If the match between technology and operational needs can be achieved, companies will be better prepared to manage operational challenges, provide fast and accurate services, and create sustainable competitive advantages in the highly competitive E-Commerce industry.

CONCLUSION

The results of this study indicate that order complexity has a positive effect on the fit between tasks and technology (Task-Technology Fit/TTF) but has the potential to reduce the level of service (Service Level) if not mediated properly. On the other hand, the capability of the logistics system is proven to significantly increase TTF and has a direct impact on improving service quality. This finding confirms that TTF plays a central role in bridging operational challenges and achieving optimal service performance in the Fulfillment Center. Therefore, it is important for E-Commerce companies to design integrated operational and technological strategies, by ensuring that the systems used are relevant to the ever-growing complexity of orders. Strengthening logistics capabilities is not enough to be done only through investment in sophisticated technological devices but must also be supported by the development of human resource competencies and strong information system integration. Periodic evaluation of the fit between technology and operational needs must be part of managerial policies to maintain the effectiveness of TTF on an ongoing basis. By achieving alignment between technology and tasks, companies will be better prepared to face industry

dynamics, provide fast and accurate services, and build sustainable competitive advantages in the highly competitive E-Commerce market.

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