

How Do Trucking Carriers Differ from Third-Party Logistics, Couriers, and Private Fleets in Their Resilience?

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Abstract

Transportation is a highly affected sector during the COVID-19 pandemic, and trucking comprises most of Indonesia's transportation market share. Hence, more research in this transportation sector is critical for enhancing Indonesian supply chain performance. This research highlight the comparative analysis across different segment of trucking companies on the resilience factors highlighted during the COVID-19 outbreak. The questionnaires were distributed to some Indonesian trucking associations with 33 private fleets, 101 trucking carriers, and 56 third-party logistics and courier participants. Partial Least Square Structural Equation modeling was used for the statistical analysis. This research reveals that financial resources management significantly enhances company resilience and performance of the private fleets, while third-party logistics and couriers mainly rely on business continuity management and finances. Truck carrier highlights a broader range of resilience factors involving financial resource management, resilient leadership, risk and business continuity management to enhance company resilience, emphasizing innovative digitalization technology and finances in correlation to company performance. This study provides managerial insight into different trucking segments and opens the possibility of extending the business and diversifying the investment.

Keywords

Trucking, Supply chain disruption, Resilience, Risk and business continuity management, Performance

1. Introduction

Transportation is a sector highly impacted by COVID-19 (Shen et al. 2020). Therefore, more research on this topic is crucial to help trucking companies sustain operations during this COVID-19 pandemic. Trucking companies consist of a few different segments. Our research classified these trucking companies into truck carriers, private fleets, third-party logistics, and couriers.

Kähkönen et al. (2021) suggest a comparative analysis across different countries and industries. Dohmen et al. (2022) also recommend more research comparing the resilience act. In addition, Hosseini et al. (2020) suggest future studies connecting resilience and performance. Mitreğa and Choi (2021) have researched relationship management in Poland transportation companies and recommend future studies related to this topic in other countries. In addition, Mohapatra et al. (2021) also recommend upcoming research involving quantitative statistical analysis of factors contributing to company performance. Lestari et al. (2022) discussed problems and actions in different industry sectors in Indonesia, including logistics and transportation, yet the scope is only on implementing health protocol during the COVID-19 pandemic.

Most studies highlight specific sectors, while none of the research discusses various business types or sizes (Rebmann et al. 2013). Hence, they observed different sectors in the United States and found out that the pandemic preparedness of more prominent firms is better than the small ones. Lookman et al. (2023) discussed Indonesian trucking companies, yet their research only focused on competitive advantages and innovative capabilities. Our previous research discussed a comparative analysis of different sizes of Indonesian trucking companies (Sugianto et al. 2022a), did a comparative

analysis between the top and the least performer trucking companies (Sugianto et al. 2022b), and also proposed a survivability framework to survive the COVID-19 pandemic in the Indonesian trucking business (Sugianto et al. 2023). However, no studies discuss comparative analysis across different trucking segments in Indonesia by examining resilience factors and their correlation to resilience and performance. This study is different from all others as it captures a comparative analysis of different trucking sectors through the angle of resilience and performance and tries to answer the following research question:

RQ1: What are the differences between trucking carriers, third-party logistics, couriers, and private fleets through the angle of company resilience and performance?

2. Theoretical Background

2.1 Trucking Business Segment

Private fleets are trucking companies that produce or have their product while at once managing the product's distribution and usually own trucks, trailers, and drivers to serve and distribute their products (Overton 2017), (Watmore 2021). Thus, distributors and factories that own trucks are placed in this category. Establishing this private fleet company usually comes from the thought that the company will gain cost-saving benefits and have complete control by managing the transportation themselves (Lilja 2019). Many things should be done, from the paperwork, staff, and driver recruitment to vehicle monitoring and maintenance. Hence, it often comes with more time management and higher cost. This type of transportation usually faces the challenges of limited drivers (Lilja 2019), (Watmore 2021). Walmart Stores and PepsiCo Inc are well-known private fleets companies (Overton 2017).

Third-party logistics, or 3PL, is trucking companies that offer a broader range of services from the essentials to the customized alternative and act as a one-stop logistic provider, yet do not produce their product (Marasco 2008), (Bask 2001), (Lilja 2019), (Watmore 2021). Unlike private fleets, driver replacement is not an issue for third-party logistics. The work is usually tailored based on the demand for the driver or truck in contractual agreements with some well-known and credible companies (Watmore 2021).

Courier is a trucking company that usually handle small and lighter product shipment, emphasize just-in-time delivery, consist of features of delivery time estimation, track, and trace, insurance, a broader scope of the destination area, dynamic pricing, flexible cost per mile price, remote software access (GoShare 2022). During the COVID-19 pandemic, e-commerce was snowballing, and this type of transportation in Poland caused an incline in 20 to 100 percent parcel delivery (Milewski and Milewska 2021).

Truck carrier is trucking companies that handle the commercial palletized product and heavier shipment. These transportation companies usually have cross-docking areas complete with special equipment used for product loading and unloading and distribute the product from the shipper to the customer in the form of full truckload (FTL) or less-than-truckload (LTL) (GoShare 2022).

2.2 Resilience Factors, Company Resilience and Performance

Badakhshan and Ball (2022) reveal no correlation between robustness and supply chain performance while confirming a significant positive relationship between financial performance and resilience. Similarly, Nieman and Nieuwenhuizen (2009) stated that financial management is critical in determining business success. A company that uses financial data to guide top management's decisions in negotiation tends to increase its survivability compared to one that limits its use (Hall 1995).

Furthermore, leadership is a crucial factor in guiding the company under difficult circumstances (Engeman 2019), (Pearson and Claire 1998) and contributes to the success of the projects.

Next, risk management is a determinant factor for achieving sustainable corporate immunity (Ueda 2012), (De Bakker et al. 2012), (Schieg 2006). The absence of the current plan is a significant obstacle to capital market loss during the crisis (Deloitte 2005).

Resilience is associated with a company's capability to adapt, retaliate and return to normal condition after a crisis and is a determinant survival factor that combines agility, elasticity, redundancy, preparedness, and elasticity (Bloss et al. 2012), (Djalante et al. 2020), (Holling 1973), (Aven 2016), (Rapaccini et al. 2020).

Liquidity and bankruptcy have become a growing topic among scholars (Bircan et al. 2020) as liquidity has become a significant obstacle during the COVID-19 pandemic nationwide (Amah et al. 2020). They also stated that the COVID-19 outbreak tormented the company's liquidity, thus increasing bankruptcy risk. Similarly, this outbreak also causes a decline in the energy sector's performance (Liu et al. 2020).

3. Methods

The conceptual framework has been established based on an extensive literature review. Resilience factors were linked to company resilience; then, company resilience was connected to company performance (Figure 1). Considering some advantages of the Likert scale that allow participants to express their thoughts with less cognitive thinking (Likert 1932), (Chyung et al. 2017), the questionnaire was developed using a five-point Likert scale.

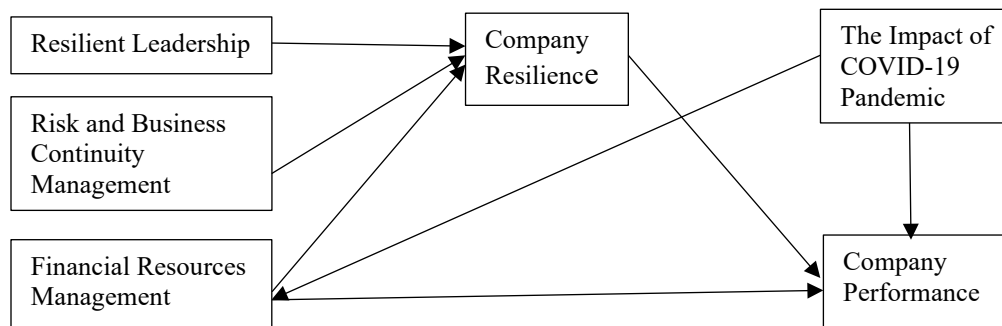


Figure 1. Conceptual Framework of Different Trucking Segments

4. Data Collection

The questionnaires were distributed, targeting a different segment of trucking companies that involves private fleets, truck carriers, third-party logistics, and couriers in Indonesia. The private fleets comprise distributors and factories that own trucks. The survey was distributed through some Indonesian trucking associations around August 2021.

Partial Least Square Structural Equation Modeling (PLS-SEM) was used for the statistical analysis. Internal reliability is measured from the value of rho_A, Cronbach alpha, and composite reliability, while factor loading and AVE are looked through to measure the convergent validity (Hair et al. 2018). It first started with a pilot survey that involved fifty respondents. The recommended threshold of 0.7 for rho_A and 0.6 for Cronbach alpha and factor loading are used for the pilot survey (Dijkstra and Henseler 2015), (Dijkstra and Schermelleh-Engel 2014), (Nayak et al. 2021), (Nunnally 1975). After all the construct and indicators were valid and reliable, a more extensive survey was conducted. A threshold of 0.7-factor loading is used for this survey. One hundred one truck carriers, 33 private fleets, and 56

third-party logistics and couriers participate in this survey. Comparative analysis performs to differentiate different trucking segments. This survey involves 101 truck carriers, 33 private fleets, and 56 third-party logistics and couriers.

5. Comparative Analysis Results and Discussion of Different Trucking Segments

5.1 Hypothesis Test Result of Private Fleets, Third party-Logistics and Couriers, Truck Carriers

Table 1. Private Fleets Hypothesis Analysis

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
FRM → PER	0.486	0.482	0.123	3.961	0.000 ^a
FRM → RES	0.755	0.752	0.076	9.923	0.000 ^a
IMP → FRM	-0.760	-0.770	0.053	14.291	0.000 ^a
RES → PER	0.475	0.485	0.126	3.753	0.000 ^a

^a significant at alpha 0.05

Table 1 shows that the impact of COVID-19 significantly affects the private fleet's performance. One unit inclined in the impact of the COVID-19 pandemic relates to a 0.760 reduction in company performance. Furthermore, financial resource management is crucial to company resilience and performance. One unit rise in financial resources management resulted in a 0.755 enhancement of company resilience, while one unit incline in financial resources management led to a 0.486 improvement in company performance. In addition, company resilience contributes to the company performance of the private fleets.

Table 2. Third-Party Logistics and Couriers Hypothesis Analysis

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
FRM → RES	0.320	0.305	0.111	2.877	0.004 ^a
IMP → PER	-0.586	-0.588	0.084	6.978	0.000 ^a
RBCM → RES	0.461	0.490	0.126	3.660	0.000 ^a
RES → PER	0.388	0.391	0.094	4.131	0.000 ^a

^a significant at alpha 0.05

Table 2 reveals that the impact of COVID-19 has a tremendous effect on company performance as one unit increase in the impact of the COVID-19 pandemic contributes to a 0.586 decline in performance. Furthermore, risk, business continuity, and financial resource management significantly contribute to company resilience. One unit increase in risk and business continuity management contributes to 0.461 inclined in company resilience, whereas one unit improvement of financial resources management leads to 0.320 enhancement of company resilience. In addition, one unit increase in company resilience resulted in a 0.388 improvement in company performance.

Table 3. Truck Carrier Companies Hypothesis Analysis

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
FRM → PER	0.651	0.645	0.067	9.669	0.000 ^a
FRM → RES	0.260	0.260	0.114	2.275	0.023 ^a
IDT → PER	0.161	0.166	0.073	2.188	0.029 ^a
IMP → PER	-0.177	-0.181	0.072	2.465	0.014 ^a
RBCM → RES	0.294	0.311	0.144	2.039	0.041 ^a
RLEAD → RES	0.248	0.236	0.112	2.215	0.027 ^a

^a significant at alpha 0.05

Table 3 shows that the impact of COVID-19 significantly correlates to company performance, as one unit increase in the impact of the COVID-19 pandemic contributes to a 0.177 decline in performance. In addition, financial resources management, resilient leadership, risk, and business continuity management contribute significantly to company resilience. Furthermore, financial resource management, resilient leadership, and financial resource management significantly correlated to company performance.

5.2 Private Fleets, Truck Carriers, Third-Party Logistics, and Couriers Framework

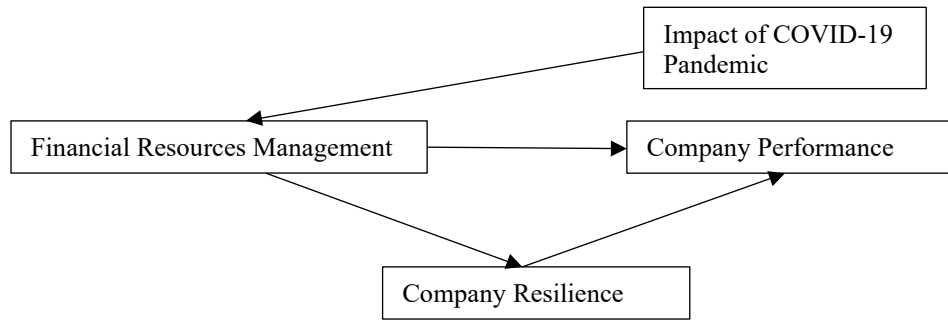


Figure 2. Private Fleet Framework

Figure 2 illustrates that financial resource management is vital during the COVID-19 pandemic in private fleets, as it is the only factor contributing to company resilience and performance. Furthermore, COVID-19 significantly affects these private companies' financial resources and management.

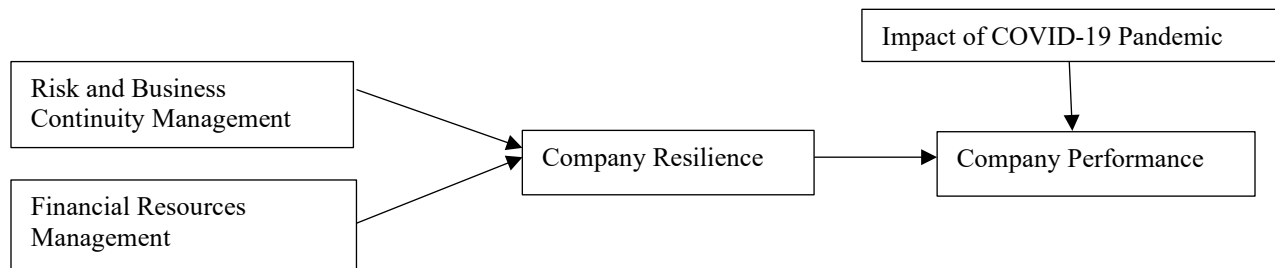
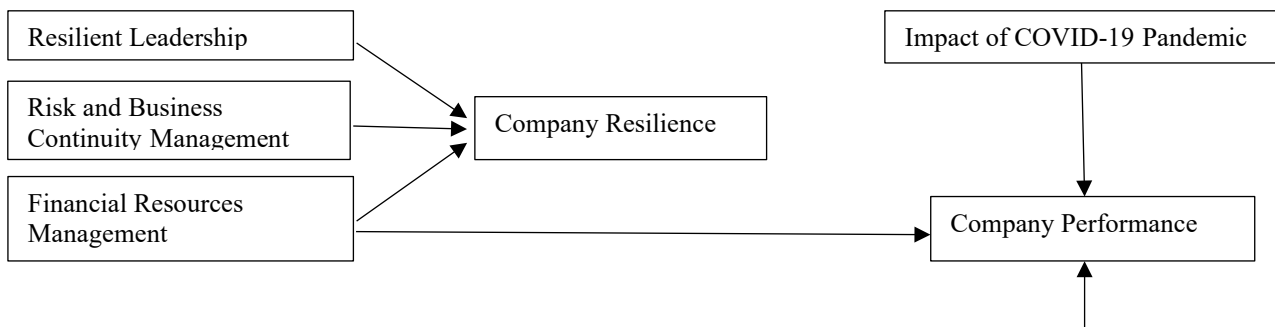


Figure 3. Third-Party Logistics and Couriers Framework

Financial resources management, risk, and business continuity management contribute significantly to company resilience and indirectly relate to company performance of third-party logistics and couriers. As predicted, the COVID-19 pandemic also significantly impacts the company performance of this trucking segment (Figure 3).



Innovation digitalization
 technology

Figure 4. Trucking Carriers Framework

Resilient leadership, risk and business continuity management, and financial resources management play a significant role in enhancing company resilience, while innovative digitalization technology contributes significantly to the company performance of trucking carrier companies. Once again, the impact of COVID-19 appears to have a tremendous effect on the company performance of these truck carrier companies (Figure 4).

5.3 Validity, Reliability and Goodness of Fit Result

Table 4. Private Fleet Measurement Model

Private Fleet (Distributor and Factory that Own Truck)							
Latent Variable	Measurement Model					Discriminant Validity	
	Convergent Validity		Internal Consistency Reliability			HTMT	Fornell-Larcker Right Diagonal
	Factor loading	AVE	Cronbach's Alpha	rho_A	Composite Reliability		
All Values>0.7					All Values <1	Values>others on the left	
FRM	Yes	0.800	0.875	0.875	0.923	Yes	Yes
IMP	Yes	0.735	0.909	0.925	0.932	Yes	Yes
PER	Yes	0.738	0.910	0.914	0.934	Yes	Yes
RES	Yes	0.803	0.876	0.955	0.923	Yes	Yes
Goodness of Fit							
SRMR Saturated	0.102						
SRMR Estimated	0.109						
Chi-Square Saturated	226.447						
Chi-Square Estimated	228.030						

All values for the rho_A, composite reliability value, Cronbach alpha, factor loading, and AVE are greater than 0.7 for the private fleets (Table 4). The value of SRMR saturated values and SRMR estimated pointed out the value of 0.102 and 0.109, respectively. These values are very close to the threshold of 0.1 recommended by Henseler and Sarstedt (2013). Furthermore, Chi-Square estimated at 228.030 is greater than Chi-Square saturated value at 226.447, implying an acceptable goodness of fit.

Table 5. Third-Party Logistics Measurement Model

Third-Party Logistics+Couriers							
Latent Variable	Measurement Model					Discriminant Validity	
	Convergent Validity		Internal Consistency Reliability			HTMT	Fornell-Larcker Right Diagonal
	Factor loading	AVE	Cronbach's Alpha	rho_A	Composite Reliability		
All Values>0.7					All Values <1	Values>others on the left	

FRM	Yes	0.836	0.808	0,858	0.911	Yes	Yes
IMP	Yes	0.708	0.862	0,871	0.906	Yes	Yes
PER	Yes	0.703	0.858	0,869	0.904	Yes	Yes
RBCM	Yes	0.752	0.918	0,930	0.938	Yes	Yes
RES	Yes	0.831	0.797	0,800	0.908	Yes	Yes
Goodness of Fit							
SRMR Saturated		0.087					
SRMR Estimated		0.095					
Chi-Square Saturated		235.459					
Chi-Square Estimated		239.651					

Table 5 shows that all values for the composite reliability value, rho_A, Cronbach alpha, AVE, and factor loading are higher than 0.7 for the third-party logistics and couriers. SRMR saturated points out to 0.087, and SRMR estimated shows the value of 0.095. These values matched the threshold guidelines of 0.1 proposed by Henseler and Sarstedt (2013). In addition, Chi-Square estimated is higher than Chi-Square saturated, indicating an acceptable fit.

Table 6. Truck Carriers Measurement Model

Truck Carrier	Measurement Model						
	Convergent Validity Factor loading	AVE	Internal Consistency Reliability Cronbach's Alpha	rho_A	Composite Reliability	Discriminant Validity	
Latent Variable	All Values>0.7					HTMT All Values <1	Fornell-Larcker Right Diagonal Values>others on the left
FRM	Yes	0.726	0.811	0.816	0.888	Yes	Yes
IDT	Yes	0.713	0.808	0.842	0.882	Yes	Yes
IMP	Yes	0.712	0.602	0.633	0.832	Yes	Yes
PER	Yes	0.678	0.843	0.858	0.893	Yes	Yes
RBCM	Yes	0.691	0.852	0.886	0.899	Yes	Yes
RES	Yes	0.640	0.826	0.892	0.876	Yes	Yes
RLEAD	Yes	0.663	0.915	0.928	0.932	Yes	Yes
Goodness of Fit							
SRMR Saturated		0.099					
SRMR Estimated		0.100					
Chi-Square Saturated		822.140					
Chi-Square Estimated		829.097					

For the trucking carriers, the composite reliability is higher than 0.7, while rho_A, Cronbach alpha, and AVE point out the value above 0.6 (Table 6). However, the value of rho_A and Cronbach alpha above 0.6 are still acceptable for exploratory, and the value of AVE above 0.6 is still higher than the cut-off point of 0.5 proposed by Hair et al. (2018). Hence, this result implies that the construct and indicators used for this research are valid and reliable. The finding reveals that SRMR saturated and estimated express 0.099 and 0.1, respectively, which still align with the suggested threshold of 0.1 (Henseler and Sarstedt 2013). In addition., the Chi-Square estimated of 829.097 is greater than Chi Square saturated of 822.140. Hence, the result expresses an acceptable goodness of fit.

6. Discussion of Different Trucking Segment Comparative analysis

Our research reveals that the COVID-19 pandemic significantly affects the financial resource management of private fleets and contributes negatively to the performance of third-party logistics, couriers, and trucking carrier companies. This observation aligns with Agnese (2020), who found that the adverse effect of the COVID-19 outbreak resulted in a poor turnover and reduced transport volume by 50 to 60 percent. Similarly, Mengyao and Shen (2020) also captured the negative impact of the COVID-19 pandemic on energy sector performance during the first quarter of 2020.

Financial resource management is crucial in enhancing company resilience and performance during the COVID-19 pandemic in private fleets, which usually comprise distributors and factories that own trucks. This result is consistent with Lilja (2018), who stated that private fleets usually establish from the thought of cost-saving advantages that the company can gain. Unlike private fleets, third-party logistics and couriers emphasize financial resources management and risk and business continuity management. However, trucking carriers can manage broader resilience factors such as resilient leadership, risk and business continuity management to enhance their resilience. This result is probably because truck carriers usually have more trucks than third-party logistics, couriers, and private fleets. Hence, better asset management is crucial. In addition, financial resource management and innovative digitalization technology contribute positively to these trucking carriers' company performance. One reason might be that the main business of distributors and factories are selling their products, while the trucking itself is only for supporting system to minimize the transportation cost. In contrast, trucking is the truck carrier's primary business which they need to perform well. These trucking carriers use innovation and digitalization to manage their brand positioning and help to market their products.

Kato and Charoenrat (2018) claim that implementing risk and business continuity management can hinder the negative effect of a crisis. Excellent risk and business continuity management can enhance the company management process, which is one of the most probable reasons truck carriers, third-party logistics, and courier companies highlight risk and business continuity management concerning company resilience.

Most cargo and Indonesian freight are categorized as small business enterprises (Sasono 2003). These companies usually manage traditionally, have financial constraints, and limited technological adoption. During the COVID-19 outbreak, this situation becomes more challenging to be adaptive and flexible, especially under financial limitations. All of these reasons might be why company adaptability and flexibility do not correlate with company resilience or performance during the COVID-19 pandemic outbreak for all these three segments of trucking companies.

7. Conclusion and Managerial Implementation

Our study reveals that COVID-19 significantly impacts all these trucking segments, comprising private fleets, truck carriers, third-party logistics, and couriers. However, each segment reacts differently concerning the resilience factors they emphasized. Truck carrier highlights more resilience factors than private fleets, third-party logistics, and couriers. Interestingly, third-party logistics and couriers comprise the majority of top perform companies. Exploring and knowing the differences between these trucking segments opens up knowledge horizons and gives the top management insight into business diversification.

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