

## THE EFFECT OF COST, INNOVATION, AND LOGISTIC CAPABILITY ON COMPETITIVE ADVANTAGE AND ITS IMPLICATIONS ON PHARMACEUTICAL INDUSTRY SUPPLY CHAIN PERFORMANCE



**Reginata Xaviera<sup>1</sup>**

**Universitas Trisakti, Jakarta, Indonesia**  
[122012301069@std.trisakti.ac.id](mailto:122012301069@std.trisakti.ac.id)

**Wahyuningsih Santosa<sup>2</sup>**

**Universitas Trisakti, Jakarta, Indonesia**  
[wahyuningsih@trisakti.ac.id](mailto:wahyuningsih@trisakti.ac.id)

**Triwulandari Satitidjati Dewayana<sup>3</sup>**

**Universitas Trisakti, Jakarta, Indonesia**  
[triwulandari\\_sd@trisakti.ac.id](mailto:triwulandari_sd@trisakti.ac.id)

---

### Abstract

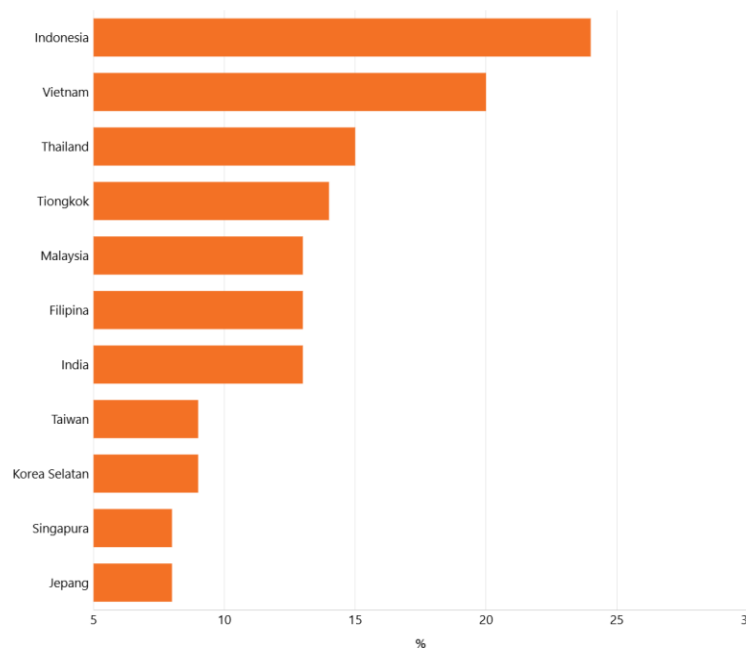
This study evaluates the effects of cost, innovation, and logistics capability on competitive advantage and supply chain performance. Using appropriate analysis methods, this study found that cost, innovation, and logistics capability significantly affect competitive advantage and supply chain performance. In particular, efficient costs, continuous innovation, and good logistics capability are proven to contribute positively to increasing competitive advantage. In addition, competitive advantage also plays an important role in improving overall supply chain performance. The results of this study indicate that companies that can manage costs effectively, innovate, and develop their logistics capabilities can achieve competitive advantages that have a positive impact on their supply chain performance. These findings provide valuable insights for managerial practices and supply chain management strategies to improve competitiveness and operational efficiency.

**Keywords:** Cost, Innovation, Logistics Capability, Competitive Advantage, Supply Chain Performance of Pharmaceutical Industry

## INTRODUCTION

In the era of globalization and increasingly fierce competition, supply chain efficiency and effectiveness are crucial factors for a company's success (Setiawan, 2023). In Indonesia, challenges in supply chain management include high logistics costs, the need for innovation and increased logistics capabilities (Ricardianto, et al., 2020).

One of the main challenges in the supply chain in Indonesia is the high cost of logistics. According to data from the World Bank, logistics costs in Indonesia reach around 24% of Gross Domestic Product (GDP), much higher than other Asian countries which range from 10-15% (Ministry of Finance, 2023). These high costs are caused by inadequate infrastructure, low operational efficiency, and suboptimal regulations. Effective cost management is very important for companies to improve their efficiency and competitiveness in the market (Febransyah & Goni, 2020).



**Figure 1.**  
**Logistics Costs Against Gross Domestic Product (GDP) Graph  
in Asia in 2023**

Innovation is a key factor in increasing a company's competitive advantage (Shahadat, et al., 2023). However, the adoption of technology and innovation in the supply chain is still relatively low in Indonesia. Many companies still rely on manual processes and do not utilize

digital technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and blockchain (Adhiarna, 2024).

Based on data from the Indonesian Digital Society Index (IMDI, 2023), digital skills in Indonesia reached 56.59% in 2023. However, the level of digital empowerment is still relatively low, at 26.19%, and digital use in work at 32.14%. This indicates that digitalization in Indonesia has not been optimally utilized. Digitalization or innovation in technology can increase the efficiency, transparency, and responsiveness of the supply chain, which can ultimately improve overall performance (Ariyanti, et al., 2023).

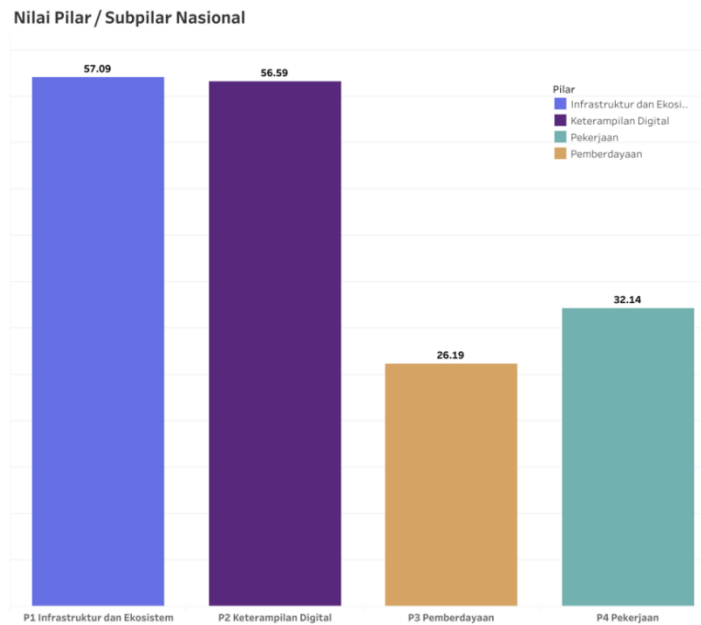


Figure 2.

### Indonesia Digital Society Index Chart 2023

Logistics capability is the ability of a company to manage the flow of goods and information efficiently and effectively (Tukamuhabwa, et al., 2023). In Indonesia, logistics capability still faces constraints such as limited transportation infrastructure, limited storage facilities, and a lack of trained human resources (Prasetyo & Toha, 2023). Developing strong logistics capabilities can help companies overcome these constraints, ensure timely delivery, and reduce operational costs (INSA, 2023).

Research is conducted in the pharmaceutical industry for several fundamental reasons. First, pharmaceutical products have a direct impact on the health and safety of consumers. An efficient and effective supply chain is essential to ensure the timely

availability of safe and quality medicines (Tessalonika, et al., 2023). Second, the pharmaceutical industry continues to evolve with innovations and technologies. Supply chain research can explore how these innovations can improve supply chain performance (Boediono, 2021). Finally, the pharmaceutical industry is one of the important economic sectors because it contributes significantly to GDP and employment in Indonesia (BPS, 2024). Improving supply chain performance in this sector can have a broad economic impact.

This study aims to analyze the influence of cost, innovation, and logistics capability on competitive advantage and its implications on the performance of the pharmaceutical industry supply chain. By understanding this relationship, it is hoped that the study can provide useful insights for companies in increasing efficiency and competitiveness in an increasingly competitive market.

## **REVIEW OF LITERATURE**

### **Supply Chain Costs**

Supply chain costs are the total costs incurred in the process of managing the flow of goods, information, and funds from suppliers to end consumers. According to research conducted by Ha, et al. (2022), supply chain costs include various components, including raw material procurement costs, production costs, storage costs, transportation costs, and distribution costs. These costs also involve operational costs related to inventory management, goods handling, and information system management that ensures efficiency and transparency throughout the supply chain.

### **Supply Chain Innovation**

Supply chain innovation refers to the application of new ideas, methods, or technologies in supply chain management to improve efficiency, effectiveness, and responsiveness. The main objectives of supply chain innovation are to reduce operational costs, increase customer satisfaction, and provide a competitive advantage in the global market. In addition, innovation in the supply chain often involves increasing flexibility and integration between different parts of the supply chain (Khanuja & Jain, 2021).

### **Supply Chain Logistics Capabilities**

Logistics capability in the supply chain refers to a company's ability to manage the flow of goods, information, and resources efficiently and effectively, from the point of origin to the point of consumption (Liu & Song, 2023). Merkert & Hoberg (2022) stated that strong logistics capability includes several important aspects such as transportation management, warehousing management, and inventory control. Effective transportation management ensures timely and cost-efficient delivery of goods, while good warehousing management ensures efficient and accurate storage and processing of goods.

### **Supply Chain Competitive Advantage**

Supply chain competitive advantage refers to a company's ability to differentiate itself from competitors through efficient and effective supply chain management (Reklitis, et al., 2021). Competitive advantage can be achieved through a differentiation strategy, where the company offers a unique product or service, or through a cost reduction strategy (Nuraini et al, 2021). Implementing effective supply chain management enables companies to achieve this advantage by reducing operational costs and increasing the speed of response to market demand (Porter, 2021).

### **Supply Chain Performance**

Supply chain performance refers to the ability of a supply chain to achieve its stated objectives, such as operational efficiency, cost reduction, and improved customer service. Supply chain performance can be measured using a variety of metrics, including cost, innovation, and logistics capabilities (Khanuja & Jain, 2021).

## **RESEARCH METHOD**

This research design uses a hypothesis testing design with the aim of testing previously formulated hypotheses. This design is suitable for evaluating the relationship between variables based on existing theories and ensuring whether the proposed hypothesis can be accepted or rejected.

This study is cross-sectional, meaning that data collection is carried out at a certain point in time. This method allows for a representative picture of the population at the same time, so that the results can be used for correlation and causality analysis.

The unit of analysis in this study is individuals who are targeted at pharmaceutical companies located in Jakarta, Indonesia. Companies will be contacted through electronic communication media such as e-mail, Whatsapp, Linkedin, and other media.

The sampling technique in this study is based on the purposive sampling method using a Likert Scale with a score of 1-5. A score of 1 indicates Strongly Disagree (STS) while 5 indicates Strongly Agree (SS). This is based on considerations that are adjusted to the variables used in this study to obtain appropriate results. Analysis of the relationship between variables and hypotheses will be measured using the Structural Equation Modeling (SEM) analysis tool and analyzed with the help of AMOS software.

## RESULTS AND DISCUSSION

**Table 1.**  
**Respondent Profile**

Respondent Profile	Characteristics	Frequency	Percentage
Company	Dexa Medica	25	20.8%
	Kalbe Farma	23	19.2%
	Chemical Pharmacy	24	20.0%
	Novartis	22	18.3%
	Tempo Scan Pacific	26	21.7%
	Other	0	0.0%
	<b>TOTAL</b>	<b>120</b>	<b>100.0%</b>
Gender	Man	87	72.5%
	Woman	33	27.5%
	<b>TOTAL</b>	<b>120</b>	<b>100.0%</b>
Job Title	Supply Chain Staff	58	48.3%
	Supply Chain Supervisor	42	35.0%
	Supply Chain Manager	20	16.7%
	Other	0	0.0%
	<b>TOTAL</b>	<b>120</b>	<b>100.0%</b>
Years of service	< 1 year	2	1.7%
	≥ 1 - 5 years	25	20.8%
	≥ 5 - 10 years	52	43.3%
	≥ 10 years	41	34.2%
	<b>TOTAL</b>	<b>120</b>	<b>100.0%</b>
<b>AMOUNT</b>		<b>120</b>	<b>100.0%</b>

Source: Google Form Output

Based on Table 1 above, 120 respondents meet the criteria to fill out the questionnaire, which shows that all respondents work in the top 5 pharmaceutical industries in Jakarta with a percentage of 100.0%.

All respondents involved in this study work in the supply chain sector, which includes logistics, warehousing, and other related functions. As many as 48.3% or 58 respondents are staff, 35.0%, or 42 respondents are supervisors, and the remaining 16.7%, or 20 respondents are managers.

Based on the length of work experience, most respondents, namely 43.3% or 52 respondents, have worked for 5-10 years. As many as 34.2% or 41 respondents have more than 10 years of work experience. 20.8% or 25 respondents have worked for 1-5 years and only 1.7% or 2 respondents have less than 1 year of work experience.

The data also shows that the majority of respondents were male 62.5% or 87 respondents and female 27.5% or 33 respondents,

### Exploratory Factor Analysis (EFA)

**Table 2.**  
**KMO and Bartlett's Test Results Table**

Criteria	Mark	Information
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)	0.757	Valid
Bartlett's Test of Sphericity	0,000	Valid

Description: KMO is valid if  $> 0.5$ ; Bartlett's Test is valid if  $< 0.05$

Source: AMOS 22 Output

Based on the table above, the following results can be seen:

- The KMO value of 0.757 is greater than 0.50 and is declared valid.

This states that the data sample is adequate for factor analysis so that the construct variables can form latent variables (factors) quite well. In other words, there is enough variance that can be explained by the factors formed (Field, 2024).

- Bartlett's Test value of 0.000 is less than 0.05.

This indicates that there is a fairly strong correlation between the construct variables, so that factor analysis can be carried out to reveal the underlying structure of the data (Field, 2024).

**EFA Test of Supply Chain Cost Variables**

**Table 3.**  
**EFA Test Results Table of Supply Chain Cost Variables**

Construct Variables	Pattern Matrix		Cronbach's Alpha
	Loading Factor	Information	
SC1	0.759	Valid	0.755 Reliable
SC2	0.667	Valid	
SC3	0.821	Valid	
SC4	0.622	Valid	

Description: pattern matrix is valid if loading factor > 0.4; reliable if Cronbach's Alpha > 0.60

Source: AMOS 22 Output

Based on the table above, the following results can be seen:

- The loading factor value of each construct variable is greater than 0.40 and is declared valid (Field, 2024).
- The Cronbach's Alpha reliability results of 0.755 are greater than 0.60, so the research variables are declared reliable (Hair, et al., 2021).
- Overall, the results of the Exploratory Factor Analysis (EFA) test have met the criteria and can be used in further testing.

**EFA Test of Supply Chain Innovation Variables**

**Table 4.**  
**EFA Test Results Table of Supply Chain Innovation Variables**

Construct Variables	Pattern Matrix		Cronbach's Alpha
	Loading Factor	Information	
SI1	0.860	Valid	0.766 Reliable
SI2	0.697	Valid	
SI3	0.642	Valid	
SI4	0.764	Valid	

Description: pattern matrix is valid if loading factor > 0.4; reliable if Cronbach's Alpha > 0.60

Source: AMOS 22 Output

Based on the table above, the following results can be seen:

- The loading factor value of each construct variable is greater than 0.40 and is declared valid (Field, 2024).
- The Cronbach's Alpha reliability result of 0.766 is greater than 0.60, so the research variable is declared reliable (Hair, et al., 2021).
- Overall, the results of the Exploratory Factor Analysis (EFA) test have met the criteria and can be used in further testing.

**EFA Test of Supply Chain Logistics Capability Variables**

**Table 5.**  
**EFA Test Results Table of Supply Chain Logistics Capability Variables**

Construct Variables	Pattern Matrix		Cronbach's Alpha
	Loading Factor	Information	
SL1	0.677	Valid	0.760 Reliable
SL2	0.727	Valid	
SL3	0.832	Valid	
SL4	0.745	Valid	

Description: pattern matrix is valid if loading factor > 0.4; reliable if Cronbach's Alpha > 0.60

Source: AMOS 22 Output

Based on the table above, the following results can be seen:

- The loading factor value of each construct variable is greater than 0.40 and is declared valid (Field, 2024).
- The Cronbach's Alpha reliability results of 0.760 are greater than 0.60, so the research variables are declared reliable (Hair, et al., 2021).
- Overall, the results of the Exploratory Factor Analysis (EFA) test have met the criteria and can be used in further testing.

**EFA Test of Competitive Advantage Variables**

**Table 6.**  
**EFA Test Results Table of Competitive Advantage Variables**

Construct Variables	Pattern Matrix		Cronbach's Alpha
	Loading Factor	Information	
CC1	0.734	Valid	

CC2	0.725	Valid	0.767 Reliable
CC3	0.688	Valid	
CC4	0.804	Valid	

Description: pattern matrix is valid if loading factor > 0.4; reliable if Cronbach's Alpha > 0.60

Source: AMOS 22 Output

Based on the table above, the following results can be seen:

- The loading factor value of each construct variable is greater than 0.40 and is declared valid (Field, 2024).
- The Cronbach's Alpha reliability results of 0.76 are greater than 0.60, so the research variables are declared reliable (Hair, et al., 2021).
- Overall, the results of the Exploratory Factor Analysis (EFA) test have met the criteria and can be used in further testing.

### EFA Test of Supply Chain Performance Variables

**Table 7.**

**EFA Test Results Table of Supply Chain Performance Variables**

Construct Variables	Pattern Matrix		Cronbach's Alpha
	Loading Factor	Information	
SP1	0.773	Valid	0.755 Reliable
SP2	0.743	Valid	
SP3	0.656	Valid	
SP4	0.541	Valid	

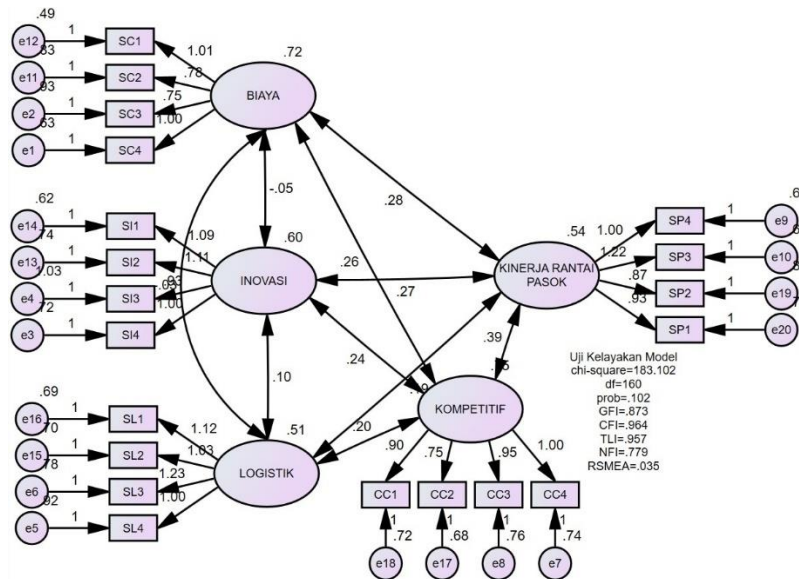
Description: pattern matrix is valid if loading factor > 0.4; reliable if Cronbach's Alpha > 0.60

Source: AMOS 22 Output

Based on the table above, the following results can be seen:

- The loading factor value of each construct variable is greater than 0.40 and is declared valid (Field, 2024).
- The Cronbach's Alpha reliability results of 0.755 are greater than 0.60, so the research variables are declared reliable (Hair, et al., 2021).
- Overall, the results of the Exploratory Factor Analysis (EFA) test have met the criteria and can be used in further testing.

**Confirmatory Factor Analysis (CFA)**



**Figure 3.**

**Results of the First Stage Confirmatory Factor Analysis (CFA) of the Research Model**

**Table 8.**

**Table of Results of First Stage CFA Test of Research Model**

Goodness of Fit	Cut-off	Results in the Model	Information
P value/prob	≥ 0.05	0.102	Goodness of Fit
Chi-Square	Small and insignificant	183,102	Goodness of Fit
RMSEA	≤ 0.08	0.035	Goodness of Fit
GFI	≥ 0.90	0.873	Marginal Fit
AGFI	≥ 0.90	0.834	Marginal Fit
CMIN/Df	≤ 2	1,144	Goodness of Fit
TLI	> 0.95	0.957	Goodness of Fit
CFI	> 0.95	0.964	Goodness of Fit
Chi-square table	190,516		

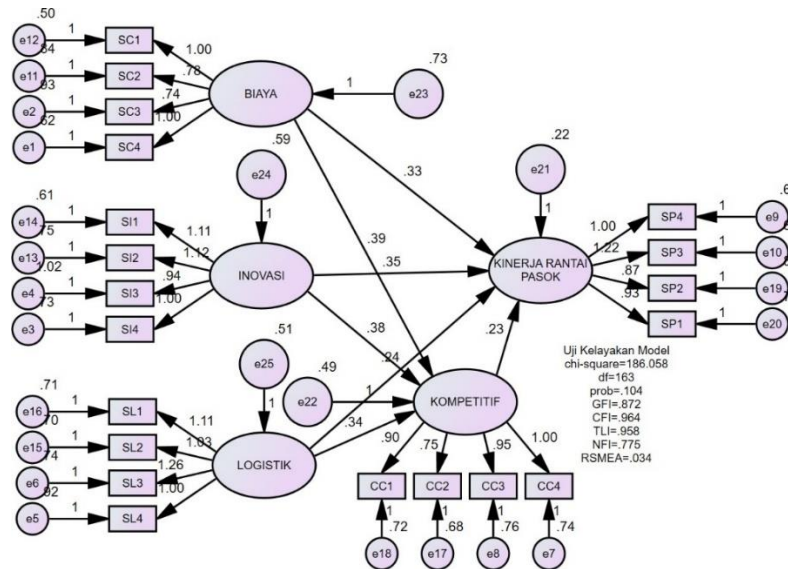
Source: AMOS 22 Output

Based on the results of the Confirmatory Factor Analysis (CFA) model 1 in the table above, the following results were obtained:

- The chi-square significance value (P value/prob in the model image) of 0.102 is greater than 0.05, so it can be stated that it meets the model feasibility requirements.

- The Chi-Square value of model 183.102 is smaller than the Chi-Square value of table 190.516, so it can be stated that it meets the model feasibility requirements.
- The RMSEA value of 0.035 is smaller than the cut-off value, so it can be stated that it meets the model feasibility requirements.
- The CMIN/Df, TLI, CFI, and AGFI values have values greater than the cut-off value and have met the model feasibility criteria, except for the GFI criteria, AGFI is in the marginal fit category.
- The research model as a whole has met the required goodness of fit criteria (Hair, et al., 2021).

**Structural Equation Modeling (SEM) Analysis of Research Hypothesis**



**Figure 4.**

**Results of Structural Equation Modeling (SEM) Analysis of Research Hypothesis**

**Table 9.**

**Table of Results of Structural Equation Modeling (SEM) Model Fit Research Hypothesis**

Goodness of Fit	Cut-off	Results in the Model	Information
P value/prob	≥ 0.05	0.104	Goodness of Fit
Chi-Square	Small and insignificant	186,058	Goodness of Fit
RMSEA	≤ 0.08	0.034	Goodness of Fit
GFI	≥ 0.90	0.872	Marginal Fit

AGFI	$\geq 0.90$	0.835	Marginal Fit
CMIN/Df	$\leq 2$	1,141	Goodness of Fit
TLI	$> 0.95$	0.958	Goodness of Fit
CFI	$> 0.95$	0.964	Goodness of Fit
Chi-square table	193,791		

Source: AMOS 22 Output

Based on the results of the Structural Equation Modeling research hypothesis in the table above, the following results were obtained:

- The chi-square significance value (P value/prob in the model image) of 0.104 is greater than 0.05, so it can be stated that it meets the model feasibility requirements.
- The Chi-Square value of model 186.058 is smaller than the Chi-Square value of table 193.791, so it can be stated that it meets the model feasibility requirements.
- The RMSEA value of 0.034 is smaller than the cut-off value, so it can be stated that it meets the model feasibility requirements.
- The CMIN/Df, TLI, CFI, and AGFI values have values greater than the cut-off value and have met the model feasibility criteria, except for the GFI criteria, AGFI is in the marginal fit category.
- The research model as a whole has met the required goodness of fit criteria (Hair, et al., 2021).

### Data Normality Test

In the AMOS output, the normality test is carried out using the CR (critical ratio) skewness criterion of  $\pm 2.58$  in the assessment of normality with a significant level of data that can be said to be normally distributed if the critical ratio skewness value is  $\pm 2.58$ .

**Table 10.**  
**Data Normality Test Results Table**

Variables	skew	cr	kurtosis	cr	Information
SC1	-0.635	-2,838	-0.432	-0.965	Normal
SC2	-0.836	-3,738	-0.119	-0.265	Normal
SC3	-0.825	-3,688	-0.084	-0.188	Normal
SC4	-0.696	-3,113	-0.305	-0.682	Normal
SI1	-0.602	-2,692	-0.561	-1,254	Normal
SI2	-0.475	-2,123	-0.928	-2,074	Normal
SI3	-0.942	-4,215	-0.097	-0.217	Normal
SI4	-0.619	-2,769	-0.535	-1,195	Normal

SL1	-0.682	-3,048	-0.370	-0.828	Normal
SL2	-0.814	-3,642	-0.014	-0.032	Normal
SL3	-0.621	-2,778	-0.615	-1,375	Normal
SL4	-0.713	-3,190	-0.414	-0.925	Normal
CC1	-0.914	-4,086	0.028	0.063	Normal
CC2	-0.953	-4,264	0.223	0.499	Normal
CC3	-0.785	-3,511	-0.477	-1,066	Normal
CC4	-0.582	-2,603	-0.706	-1,579	Normal
SP1	-0.720	-3,221	-0.156	-0.349	Normal
SP2	-0.714	-3,195	-0.409	-0.915	Normal
SP3	-0.658	-2,943	-0.544	-1,217	Normal
SP4	-0.616	-2,754	-0.325	-0.726	Normal

Source: AMOS 22 Output

Based on the table above, the normality test for all construct variables is normal because the critical ratio (cr) values for kurtosis and skewness are between the range of -2.58 to +2.58 (Hair, et al., 2021).

### Research Hypothesis Testing

**Table 11.**  
**Research Hypothesis Test Results Table**

Hypothesis	Path Analysis Model	Coefficient $\beta$	SE	P Value	Information
H1	Cost → Competitive	0.388	0.119	0.001	Significant
H2	Innovation → Competitive	0.381	0.131	0.004	Significant
H3	Logistics → Competitive	0.341	0.141	0.015	Significant
H4	Cost → Performance	0.332	0.106	0.002	Significant
H5	Innovation → Performance	0.351	0.116	0.002	Significant
H6	Logistics → Performance	0.243	0.115	0.034	Significant
H7	Competitive → Performance	0.229	0.116	0.049	Significant

Note: Ha is accepted if P value < 0.05; \*\*\* = P value < 0.001 (Arbuckle, 2019)

Source: AMOS 22 Output

Based on the hypothesis testing in the table above, the following results were obtained:

- COST → COMPETITIVE ADVANTAGE has a coefficient estimate value of  $\beta$  0.388 and a significance of P-Value 0.001 smaller than 0.05. Based on these values, it can be stated

that there is a significant positive influence so that hypothesis H1 is accepted and Ho is rejected.

- INNOVATION→COMPETITIVE ADVANTAGE has a coefficient estimate value of  $\beta$  0.381 and a significance of P Value 0.004 which is smaller than 0.05. Based on these values, it can be stated that there is a significant positive influence so that the H2 hypothesis is accepted and Ho is rejected.
- LOGISTIC CAPABILITIES→COMPETITIVE ADVANTAGE has a coefficient estimate value of  $\beta$  0.341 and a significance of P Value 0.015 which is smaller than 0.05. Based on these values, it can be stated that there is a significant positive influence so that hypothesis H3 is accepted and Ho is rejected.
- COST→SUPPLY CHAIN PERFORMANCE has a coefficient estimate value of  $\beta$  0.332 and a significance P Value of 0.002 smaller than 0.05. Based on these values, it can be stated that there is a significant positive influence so that the H4 hypothesis is accepted and Ho is rejected.
- INNOVATION→SUPPLY CHAIN PERFORMANCE has a coefficient estimate value of  $\beta$  0.351 and a significance of P-Value 0.002 smaller than 0.05. Based on these values, it can be stated that there is a significant positive influence so that the H5 hypothesis is accepted and Ho is rejected.
- LOGISTIC CAPABILITIES→SUPPLY CHAIN PERFORMANCE has a coefficient estimate value of  $\beta$  0.243 and a significance of P-Value 0.034 smaller than 0.05. Based on these values, it can be stated that there is a significant positive influence so that the H6 hypothesis is accepted and Ho is rejected.
- COMPETITIVE ADVANTAGE→SUPPLY CHAIN PERFORMANCE has a coefficient estimate value of  $\beta$  0.229 and a significance P Value of 0.049 which is smaller than 0.05.

Based on these values, it can be stated that there is a significant positive influence so that hypothesis H7 is accepted and Ho is rejected.

## R Square (R<sup>2</sup>) Test of Research Model

**Table 12.**  
**Research Model R Square Test Results Table**

Variables	Adj. R Square
Competitive Advantage	0.342
Supply Chain Performance	0.590

Source: AMOS 22 Output

Based on the hypothesis testing in the table above, the following results were obtained:

- COMPETITIVE ADVANTAGE has an Adj. R Square value of 0.342. This shows the magnitude of the influence of the variables COST, INNOVATION, and LOGISTIC CAPABILITY together by 34.2% and the remaining 65.8% is influenced by other factors outside the study.
- SUPPLY CHAIN PERFORMANCE has an Adj. R Square value of 0.590. This shows the magnitude of the influence of the variables COST, INNOVATION, LOGISTIC CAPABILITY, and COMPETITIVE ADVANTAGE together by 59.0% and the remaining 41.0% is influenced by other factors outside the study.

## CONCLUSION

Based on the results of the research and discussion that have been presented in the previous chapter, it can be concluded that there is a significant positive influence between costs, innovation, and logistics capabilities on competitive advantage and supply chain performance. Competitive advantage itself also has a significant positive influence on supply chain performance.

## REFERENCES

- Abdalla, S. S. A. & Nakagawa, K., 2022. Entrepreneurial Leadership, Supply Chain Innovation, and Adaptability: A Cross-national Investigation. *Operations Research Forum*, 3(23), pp. 1-21.
- Abdul, F. A., Iortimbir, A. I., Oladipo, G. T. & Olota, O. O., 2019. Impact of Logistics Management on Organizational Performance. *Journal of Sustainable Development in Africa*, 21(1), pp. 36-49.
- Adhiarna, N., 2024. *MSMEs Digital Technology Intervention: Policy and Strategies in*

Indonesia, Jakarta: LPEM FEB UI.

- Aksenta, A., 2024. Utilizing Internet of Things (IoT) Technology for Supply Chain Optimization in Digital Businesses. *Management Studies and Business Journal*, 1(4), pp.609-616.
- Aldhaheri, R. T. & Ahmad, S. Z., 2023. Factors affecting organisations' supply chain agility and competitive capability. *Business Process Management Journal*, 29(2), pp. 505-527.
- Alkababji, M. W., 2023. The Impact of Applying the Target Cost and Continuous Improvement in Achieving the Sustainable Competitive Advantage of Palestinian Industrial Companies. *Journal of Business and Socio-economic Development*, 3(4), pp. 372-387.
- Arbuckle, J. L., 2019. *IBM® SPSS® Amos™ 26 User's Guide*. New York: IBM.
- Ariyanti, F. D., Nasution, J. & Mahardin, K. A., 2023. Analisis Hambatan Inisiatif Industri 4.0 pada Rantai Pasokan Industri di Indonesia. *Jurnal Penelitian dan Aplikasi Sistem dan Teknik Industri (PASTI)*, XVII(2), pp. 259-270.
- Bahri, A., 2023. *Mengenal Manajemen Rantai Pasok (Supply Chain Management)*. Bangka: Universitas Bangka Belitung.
- Bastuti, S., Alfatiyah, R., Shobur, M. & Candra, A., 2019. *Manajemen Logistik*. Tangerang: UNPAM Press.
- Boediono, L., 2021. *Ensuring a More Inclusive Future for Indonesia through Digital Technologies*, Washington: World Bank Group Press.
- BPS, 2024. *Laju Pertumbuhan PDB Industri Manufaktur, 2023*. [Online]Available at: <https://www.bps.go.id/id/statistics-table/2/MTIxNiMy/growth-rate-of-manufacturing-industry-gdp.html> [Diakses 18 Juni 2024].
- Febransyah, A. & Goni, J. I. C., 2020. Measuring the supply chain competitiveness of e-commerce industry in Indonesia. *Competitiveness Review: An International Business Journal*, 32(2), pp. 250-275.
- Field, A., 2024. *Discovering Statistics Using IBM SPSS Statistics*. 6th penyunt. London: Sage Publishing.
- Ghanbari, J., Abbasi, E., Didekhani, H. & Ashrafi, M., 2022. The Impact of Strategic Cost Management on the Relationship Between Supply Chain Practices, TopManagement Support and Financial Performance Improvement. *Journal of AppliedResearch on Industrial Engineering*, 9(1), pp. 32-49.
- Ha, N. T., Akbari, M. & Au, B., 2022. Last mile delivery in logistics and supply chain management: a bibliometric analysis and future directions. *Benchmarking: An International Journal*, 30(4), pp. 1137-1170.
- Hair, J. F. et al., 2021. *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*. Berlin: Springer.

- Harmasanto, D. H. & Setiawan, R., 2019. Pengeluaran R&D dan Kinerja Perusahaan Manufaktur di Bursa Efek Indonesia yang Dimoderasi oleh Usia Perusahaan. *Jurnal Riset Akuntansi dan Bisnis Airlangga*, 4(2), pp. 644-668.
- Iftikhar, A., Ali, I., Arslan, A. & Tarba, S., 2022. Digital Innovation, Data Analytics, and Supply Chain Resiliency: A Bibliometric-based Systematic Literature Review. *Annals of Operations Research*, Volume 333, pp. 825-848.
- IMDI, 2023. *Overview Indeks Masyarakat Digital Indonesia*. [Online] Available at: [https://imdi.sdmdigital.id/nasional\\_2023](https://imdi.sdmdigital.id/nasional_2023) [Diakses 10 June 2024].
- INSA, 2023. *Pembangunan Infrastruktur Masif, Tetapi Biaya Logistik Tetap Tinggi*, Jakarta: DPP INSA.
- Jafari, H., Eslami, M. H. & Paulraj, A., 2021. Postponement and Logistics Flexibility In Retailing: the Moderating Role of Logistics Integration and Demand Uncertainty. *International Journal of Production Economics*, Volume 243, pp. 1-16.
- Jangir, M., Chahar, D. S., Lal, R. & Sharma, S., 2024. An Overview of Statistics: Comprehending Hypothesis Testing and Statistical Imperfections (Errors and Bias). *World Journal of Pharmaceutical and Medical Research*, 10(4), pp. 90-93.
- Kemenkeu, 2023. *Terapkan NLE, Tekan Biaya Logistik*, Jakarta: Media Kemenkeu.
- Khairi, I., Susanti, D. & Firman, S., 2021. Study on Structural Equation Modeling for Analyzing Data. *International Journal of Ethno-Sciences and Education Research*, 1(3), pp. 52-60.
- Khanuja, A. & Jain, R. K., 2021. The mediating effect of supply chain flexibility on the relationship between supply chain integration and supply chain performance. *Journal of Enterprise Information Management*, 35(6), pp. 1548-1569.
- Kimiti, P. G., Muathe, S. M. A. & Murigi, E. M., 2020. Cost Leadership Strategy, Competitive Advantage, and Performance: A Cross-sectional Study in the Context of Milk Processing Firms. *International Journal of Management, Innovation & Entrepreneurial Research*, 6(2), pp. 64-76.
- Leo, G. D. & Sardanelli, F., 2020. Statistical Significance: P Value, 0.05 Threshold, and Applications to Radiomics. *European Radiology Experimental*, 4(18), pp. 1-8.
- Li, N., Huang, J. & Feng, Y., 2020. Construction and Confirmatory Factor Analysis of the Core Cognitive Ability Index System of Ship C2 System Operators. *PLOS One*, 15(8), pp. 1-23.
- Liao, S.-H., Hu, D. C. & Chen, S.-T., 2021. Supply Chain Integration, Capability and Performance – A Business-to-Business Network Cooperation. *Journal of Business and Industrial Marketing*, 37(5), pp. 1127-1137.
- Liao, S.-H., Hu, D.-C. & Chen, S.-T., 2021. Supply chain integration, capability and performance – a business-to-business network cooperation. *Journal of Business & Industrial Marketing*, 37(5), pp. 1127-1137.

- Liu, Y. & Song, G., 2023. Role of Logistics Integration Capability in Enhancing Performance in Omni-Channel Retailing: Supply Chain Integration as Mediator. *MDPI Sustainability*, 15(11), pp. 1-22.
- Liu, Y. & Song, G., 2023. Role of Logistics Integration Capability in Enhancing Performance in Omni-Channel Retailing: Supply Chain Integration as Mediator. *MDPI Sustainability*, 15(11), pp. 1-22.
- Lyu, T., Geng, Q. & Yu, D., 2022. Research on the Relationship between Network Insight, Supply Chain Integration and Enterprise Performance. *MDPI Systems*, 11(10), pp. 1-20.
- Merkert, R. & Hoberg, K., 2022. *The Future of Logistics and Supply Chain Management: Changing Skill Sets and Smart Career Choices*. Switzerland: Springer Nature.
- MITSDE, 2019. *7 Principles of Supply Chain Management*. [Online] Available at: <https://mitsde.com/7-principles-of-supply-chain-management/> [Diakses 21 06 2024].
- Ning, L. & Yao, D., 2023. The Impact of Digital Transformation on Supply Chain Capabilities and Supply Chain Competitive Performance. *MDPI Sustainability*, 15(10107), pp. 1-22.
- Nobanee, H., Alhajjar, M., Abushairah, G. & Harbi, S. A., 2021. Reputational Risk and Sustainability: A Bibliometric Analysis of Relevant Literature. *MDPI Risks*, Volume 9, pp. 1 - 21.
- Nuraini, N., Sarkum, S., & Halim, A. (2021). Analysis of Company Capability, Supply Chain Management of Competitive Advantage, and Company Performance. *Indonesian Interdisciplinary Journal of Sharia Economics (IIJSE)*, 4(1), 87-104. <https://doi.org/10.31538/ijse.v4i1.1463>
- Ozili, P. K., 2023. The Acceptable R-square in Empirical Modelling for Social Science Research. *MPRA Paper*, pp. 1-14.
- Pietrzyńska, A. B. & Motowidlak, U., 2023. Supply Chain Adaptability as a Response to Disruptions. *Scientific Journals of the Maritime University of Szczecin*, 74(146), pp. 46- 54.
- Porter, M. E., 2021. *The Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press.
- Prasetyo, D. W., & Toha, M. (2023). Analysis of Islamic Business Ethics in Buying and Selling Transactions of Agricultural Products Using a Wholesale System and Its Impact on Farmers' Income in Tanjung Kenongo Village, Pacet District, Mojokerto Regency. *Danadyaksa: Post Modern Economy Journal*, 1(1), 70 –. <https://doi.org/10.69965/danadyaksa.v1i1.12>
- Pujihastuti, A., Hastuti, N. M. & Yuliani, N., 2021. Penerapan Sistem Informasi Manajemen Rumah Sakit dalam Mendukung Pengambilan Keputusan Manajemen. *Jurnal Manajemen Informasi Kesehatan Indonesia*, 9(2), pp. 191-200.

- Rane, N. L., Achari, A. & Choudhary, S. P., 2023. Enhancing Customer Loyalty Through Quality of Service: Effective Strategies to Improve Customer Satisfaction, Experience, Relationship, and Engagement. *International Research Journal of Modernization in Engineering Technology and Science*, 5(5), pp. 427-452.
- Rasib, N. F. N. A. R., Sundram, V. P. K. & Noranee, S., 2021. Competitive Advantage Fostering Supply Chain Innovation. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 11(1), pp. 439-450.
- Reklitis, P., Sakas, D. P., Trivellas, P. & Tsoufias, G. T., 2021. Performance Implications of Aligning Supply Chain Practices with Competitive Advantage: Empirical Evidence from the Agri-Food Sector. *MDPI Sustainability*, 13(16), pp. 1-21.
- Ricardianto, P., Nasution, S., Naiborhu, M. A. & Triantoro, W., 2020. Peluang dan Tantangan Sumber Daya Manusia dalam Penyelenggaraan Pelabuhan Cerdas (Smart Port) Nasional di Masa Revolusi Industri 4.0. *Warta Penelitian Perhubungan*, pp. 59-68.
- Richey, R. G., Roath, A. S., Adams, F. G. & Wieland, A., 2021. A Responsiveness View of Logistics and Supply Chain. *Journal of Business Logistics*, pp. 1-30.
- Rounaghi, M. M., Jarrar, H. & Dana, L., 2021. Implementation of Strategic Cost Management in Manufacturing Companies: Overcoming Costs Stickiness and Increasing Corporate Sustainability. *Future Business Journal*, 7(1), pp. 1-8.
- Sallam, K. M., Mohamed, A. W. & Mohamed, M., 2023. Internet of Things (IoT) in Supply Chain Management: Challenges, Opportunities, and Best Practices. *Sustainable Machine Intelligence Journal*, Volume 2, pp. 1-32.
- Sanmartín, E. R., Abousamra, A. A., Neira, C. O. & Svensson, G., 2021. The impact of the relationship commitment and customer integration on supply chain performance. *Journal of Business & Industrial Marketing*, 38(4), pp. 943-957.
- Santos, I. M. d., Mota, C. M. d. M. & Alencar, L. H., 2021. The Strategic Alignment Between Supply Chain Process Management Maturity Model and Competitive Strategy. *Business Process Management Journal*.
- Setiawan, S. R. D., 2023. *Perusahaan Dinilai Perlu Benahi Rantai Pasok Hulu hingga Hilir, Mengapa?*, Jakarta: Kompas.
- Shahadat, M. M. H., Chowdhury, A. H. M. Y., Nathan, R. J. & Fekete-Farkas, M., 2023. Digital Technologies for Firms' Competitive Advantage and Improved Supply Chain Performance. *Journal of Risk and Financial Management*, Volume 16, pp. 1-17.
- Sriwana, I. K., Hijrah, N., Suwandi, A. & Rasjidin, R., 2021. Pengukuran Kinerja Rantai Pasok Menggunakan Supply Chain Operations Reference (SCOR) di UD. Ananda. *Jurnal Integrasi Sistem Industri*, 8(2), pp. 13-24.
- Sumarsono & Muflihah, N., 2021. Penentuan Strategi Rantai Pasok UMKM yang Kompetitif Berdasarkan Logistical-Crossfunctional Drivers: Studi Kasus Umkm di Kabupaten Jombang – Jawa Timur. *Jurnal Teknik Industri*, 16(1), pp. 42-55.

- Suwarsa, T. & Hasibuan, A. R., 2021. Pengaruh Pajak Restoran dan Pajak Hotel terhadap Pendapatan Asli Daerah Kota Padangsidempuan. *Jurnal Akutansi*, 14(2), pp. 71-85.
- Tesalonika, V. et al., 2023. *Upaya Peningkatan Efisiensi Rantai Pasok Produk Farmasi Melalui Sistem Terpusat yang Disruptif*, Surabaya: Universitas Airlangga.
- Tukamuhabwa, B., Mutebi, H. & Kyomuhendo, R., 2023. Competitive advantage in SMEs: effect of supply chain management practices, logistics capabilities and logistics integration in a developing country. *Journal of Business and Socioeconomic Development*, III(4), pp. 353-371.
- Umar, J. & Nisa, Y. F., 2020. Uji Validitas Konstruk dengan CFA dan Pelaporannya. *Jurnal Pengukuran Psikologi dan Pendidikan Indonesia*, 9(2), pp. 1-11.
- Yuan, Y., Tan, H. & Liu, L., 2023. The effects of digital transformation on supply chain resilience: a moderated and mediated model. *Journal of Enterprise Information*, 37(2), pp. 488-510.