
THE INFLUENCE OF SUPPLY CHAIN DIGITALIZATION ON INTEGRATION AND AGILITY IN COMPANY PERFORMANCE



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Abstract

This study aims to analyze the effect of supply chain digitalization on integration and agility in company performance. Supply chain digitalization is considered a key factor in improving operational efficiency and effectiveness. This study found that supply chain digitalization has a significant positive effect on supply chain integration, as well as supply chain agility. Supply chain integration, which includes better coordination and information flow, also improves overall supply chain performance. In addition, supply chain agility, which includes the ability to respond to changes quickly and adaptively, also contributes positively to company performance. The results of this study indicate that the adoption of digital technologies in the supply chain not only improves integration and agility but also has a direct impact on improving overall company performance. This study provides insights into how digitalization can be leveraged to strengthen supply chain strategies and improve company competitiveness in the global market.

Keywords: Supply Chain Digitalization, Supply Chain Integration, Supply Chain Agility and Corporate Performance

INTRODUCTION

The rapid development of information and communication technology has caused competition in the business world to become increasingly tight. Therefore, companies are required to formulate and re-evaluate their business strategies to survive with such rapid development. Supply Chain Management (SCM) is an important part of the manufacturing industry because it has main activities such as designing new products, planning production and inventory, carrying out production, shipping activities, and also procuring raw materials. In addition, SCM is the development of a strategy to organize, control, and motivate resources involved in the flow of services and materials in the supply chain.

Tan et al. (1999) emphasized that success in SCM is the key to long-term success that can improve organizational performance. Effective SCM can improve accounting-based and market-based performance measurements through increased revenue growth, reduced operating costs, and working capital efficiency. Meanwhile, if SCM is ineffective, it will cause significant financial losses in both the short and long term (Shi & Yu, 2013).

Digitalization in SCM has become a transformative force in today's business world. When an organization seeks to improve efficiency, flexibility, and competitiveness, it is advisable to turn to digital technology to optimize the supply chain process. Cooperation between humans and machines can optimize the decision-making process, resulting in better decisions and reducing errors (Tjahjono et al., 2017).

A business must be able to keep up with the times, therefore many companies have started their business strategies digitally. Since the COVID-19 pandemic, supply chain digitalization has attracted attention to carry out all activities digitally (Xue et al., 2013; Yang et al., 2021a). According to Mckinsey (2021), there has been an 84% increase in the use of digital technology in the supply chain, but 73% of companies are confused about what is meant by "digitalization" of the supply chain (SupplyChainDigest, 2016) because rapid digitalization does not necessarily result in significant improvements in supply chain performance (Paolucci et al., 2021). For example, Kitani (2019) reported that only 16% of companies experienced improved performance after starting supply chain digitalization.

In addition, digital technology is believed to enable integration across a company's functions (e.g. material management, planning, and scheduling), ensuring that teams move

forward together toward common goals (Pellondou & Santosa, 2022). Several studies have shown that supply chain agility can significantly improve a company's business performance (Goswami & Kumar, 2018; Irfan, Wang, & Akhtar, 2019). Supply chain agility has an impact on improving competitive performance within a company both operationally and financially. If each actor in the supply chain is integrated and can work together well, this will create a competitive advantage (Irfan, Wang, & Akhtar, 2019).

Indonesia is one of the developing countries where the business environment is mostly composed of MSMEs with specific structures and laws to support initiatives to promote employment and generate innovative activities (JovéLlopis, 2018). MSMEs are also classified as the backbone of the economy because they play an important role as job generators.

Based on a 2022 survey conducted by the Ministry of Cooperatives and Small and Medium Enterprises of the Republic of Indonesia (Kemenkop UKM) it revealed several main obstacles faced by MSMEs in adopting digital technology, namely limited access to technology by 40%, lack of understanding of the benefits of digitalization by 30% and limited resources by 30%. Indonesian MSMEs that have adopted digital technology are 20%. In the supply chain, many business actors in MSMEs still do not understand technology, which is a new challenge for MSMEs. If MSMEs switch to digital platforms, their market reach will increase, operational efficiency will increase and there will be increased interaction between business actors (Susanto Sastraredja).

REVIEW OF LITERATURE

Supply Chain Management

According to Jay Heizer and Barry Render (2010:4), supply chain management is the integration of procurement activities of materials and services, transformation into semi-finished goods and final products, and delivery to customers. Effective supply chain management makes suppliers “partners” in the company’s strategy to meet the ever-changing market. A competitive advantage can depend on close, long-term strategic relationships with a few suppliers. According to Pujawan (2010:24), supply chain management is an integrative method or approach to managing the flow of products, information, and money in an

integrated manner involving parties from upstream to downstream consisting of suppliers, factories, distribution networks, and logistics services.

Digitalization

Purwanto et al. (2021) stated that digitalization is expected to play an increasingly important role in the management and design of global supply chains, especially for companies that are fully involved in value-added activities, including those involved in production and logistics systems. Digitalization is described as the use of digital technology and shifting ordinary business to digital business, leading to new revenue transformations. Digitalization is a technological force that enhances globalization in economic and cultural ways. Digitalization can consist of three important stages, namely digitalization strategy, digital organization and culture, and digital cooperatives. Digitalization strategy focuses on setting digital goals and formulating and implementing digital strategies.

Supply Chain Integration

Supply chain operational capabilities including structural, technological, and logistical capabilities can play a critical role in driving superior performance from sustainable competitive capabilities. One of the paradoxes of business today is that while these Supply Chain (SC) capabilities are essential for companies to survive and thrive, the financial and managerial resources required to implement these capabilities are becoming increasingly scarce.

Supply Chain Agility

Agility was put forward by Christopher, 2000 as a concept that emphasizes responsiveness and the ability to adjust supply to demand in a volatile and unpredictable market. Agarwal et al, 2007 emphasized the importance of being agile no longer referring to forecasting-driven but rather to demand-driven. Gunasekaran, 1998 has defined agility as the ability to respond to market changes with efficient and profitable costs.

Company Performance

Performance is often defined only as output (results) or the achievement of goals that have been measured. But in fact, performance is not only from what has been achieved but how to achieve it. According to Mulyadi (2007), performance is the periodic determination of the operational effectiveness of an organization, its organizational units, and its employees

based on previously established targets, standards, and criteria. Company performance refers to how well an organization achieves market-oriented and financial goals (Yamin, Gunasekruan, and Mavondo, 1999).

RESEARCH METHOD

Research Design

This cross-sectional study is data collection by observing many subjects at a certain time. Cross-sectional data does not involve the element of time in its form, so it cannot assess changes that occur over time. Notoatmodjo stated that cross-sectional is a study that studies risk factors and effects, utilizing an approach, observation, or data collection at once.

The unit of analysis in this study is the individual, namely the respondents who participated in the questionnaire survey. Each individual will provide data used to measure the research variables.

Method of Collecting Data

Data will be collected using a questionnaire survey method. The questionnaire will be distributed to respondents who have been selected from the relevant population. The data collection process involves the following steps:

- **Preparation of Questionnaire**

Developing questions based on four variables, namely supply chain digitalization variables, supply chain integration, supply chain agility, and company performance. Then conducting validity and reliability tests.

- **Samples and Sampling Techniques**

The sampling method uses purposive sampling, which determines the number of samples based on the theory of Hair et al. 2019, which states that the number of samples in the Structural Equation Modeling (SEM) analysis is at least between 5 and 10 times the number of indicators, so the number of samples to be studied is 102 respondents.

- **Distribution of Questionnaires**

The questionnaire will be distributed online to owners, managers, employees/staff of manufacturing MSMEs in various industrial sectors (including categories: Accessories,

Craft, Fashion, Convection, Culinary, Food, Beverages, and Others) spread across the Tangerang district.

- **Data Collection**

Collecting completed questionnaires and ensuring the completeness and accuracy of the data obtained. The data taken to obtain a score that functions as the influence of supply chain digitalization on company performance was obtained in July 2024 using a Likert scale on four variables, namely supply chain digitalization variables, company performance variables, integration variables, and agility variables.

RESULTS AND DISCUSSION

Respondent Identity

The identity of the respondents is a process of describing the respondents based on gender, age, last education, and the length of time the business was pioneered. In the study, 102 respondents were obtained who filled out the questionnaire.

Table 1.
Respondent Gender

Gender	Amount	Percentage (%)
Man	60	58.82
Woman	42	41.18
Amount	102	100

Based on the table above, it can be seen that the average gender of respondents is 58.82% male and 41.18% female. Therefore, the gender that filled out the questionnaire was dominated by men.

Table 2.
Respondent Age

Age	Amount	Percentage (%)
<19 years	2	1.96
20-29 years	41	40.20
30-39 years	46	45.10
40-49 years	12	11.76
50-59 years	1	0.98
> 60 years	0	0
Amount	102	100

Based on the table above, it can be seen that the average age of respondents who own MSME businesses is 30-39 years, which is 45.10%.

Table 3.
Respondent's Last Education

Last Education	Amount	Percentage (%)
Senior High School	9	8.82
D3	12	11.76
Bachelor degree)	77	75.49
Master (S2)	4	3.92
Amount	102	100

Based on the table above, it can be seen that the average respondent who has a business is someone whose highest education is Bachelor's degree (S1), which is 75.49%.

Table 4.
Length of Time Respondent Started Business

Length of Time Starting a Business	Amount	Percentage (%)
< 1 year	5	4.90
1-5 years	52	50.98
6-10 years	37	36.27
11-15 years	7	6.86
16-20 years	1	0.98
> 20 years	0	0
Amount	102	100

Based on the table above, it can be seen that the average respondent who filled out the questionnaire was someone who had been starting a business for 1-5 years, which is 50.98%.

Normality Test

In analyzing data using Structural Equation Modeling, the distribution of the data used must meet the required assumptions of normality, meaning that if the data used in the analysis is not in the analysis. One of the requirements for data that can be processed with this method is that it is multivariate normal distributed, then the level of validity of the processing results becomes less good.

Table 5.
Normality Test Results

Variable	min	max	skew	cr	Curtosis	cr
KP3	1,000	5,000	-1,446	-5,963	3,123	6,438
KP2	2,000	5,000	-,817	-3,368	-,199	-,409
KP1	2,000	5,000	-1,008	-4,157	,394	,811
KRP6	2,000	5,000	-,745	-3,072	,038	,079
KRP5	1,000	5,000	-1,454	-5,994	2,113	4,357
KRP4	1,000	5,000	-1,097	-4,522	1,718	3,541
KRP3	2,000	5,000	-,776	-3,199	-,050	-,102
KRP2	2,000	5,000	-,996	-4,107	,336	,694
KRP1	1,000	5,000	-1,408	-5,805	2,576	5,310
IRP3	1,000	5,000	-1,627	-6,708	2,817	5,807
IRP2	2,000	5,000	-1,106	-4,561	1,159	2,389
IRP1	1,000	5,000	-1,882	-7,760	4,712	9,714
DRP5	2,000	5,000	-1,588	-6,548	2,629	5,420
DRP4	2,000	5,000	-1,130	-4,658	1,181	2,434
DRP3	2,000	5,000	-1,293	-5,331	1,574	3,245
DRP2	2,000	5,000	-1,067	-4,397	,798	1,646
DRP1	1,000	5,000	-2,405	-9,918	7,060	14,554
Multivariate					11,138	2,213

From the table above, it can be seen that the multivariate normality value is $2.213 < 2.58$, so it can be concluded that the data is normally distributed (Haryono, 2016: 60).

CFA Test

Confirmatory Factor Analysis (CFA) is often referred to as testing the validity of a theoretical construct. CFA is used to test whether the indicators are valid as a measure of latent constructs. The following is a confirmatory analysis of the variables of supply chain digitalization, supply chain integration, supply chain agility, and company performance/ Model testing with Confirmatory Factor Analysis (confirmatory factor analysis) is only carried out to determine the measurement model and not to determine the relationship between latent variables (Byrne, 1998).

The purpose of CFA is to identify an appropriate model that explains the relationship between a set of items and the construct measured by the items. A measurement model has good model accuracy when the items involved are able to be indicators of the construct being measured as evidenced by low measurement error values and high component factor

loadings. This model is obtained based on a strong theoretical study. Unlike Exploratory Factor Analysis (EFA) where researchers want to see the number of factors from the empirical data obtained, CFA has already determined the number of factors from the theoretical study, so the purpose of the analysis is only to confirm whether the proposed measurement model is following the data.

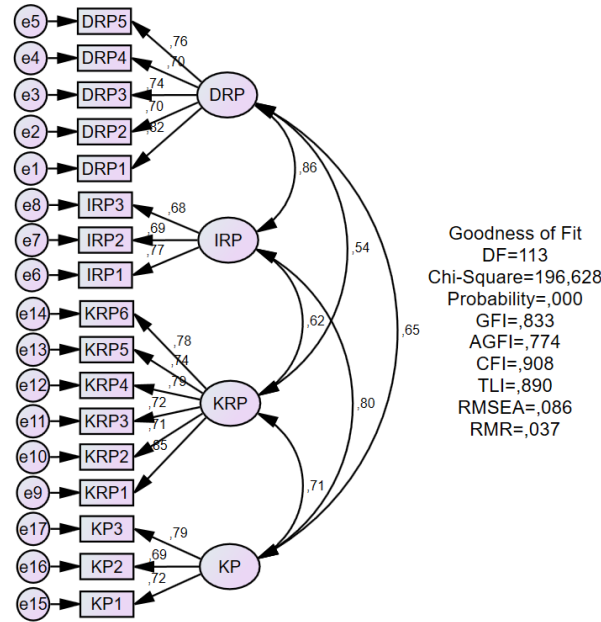


Figure 1.
CFA Model

Validity and Reliability Test Results

Table 6.
Validity and Reliability Test Results

Variables	Indicator	Loading Factor	Construct Reliability	Variance Extraction
Supply Chain Digitalization	DRP1	0.820	0.861	0.555
	DRP2	0.698		
	DRP3	0.741		
	DRP4	0.700		
	DRP5	0.760		
Supply Chain Integration	IRP1	0.771	0.757	0.511
	IRP2	0.690		
	IRP3	0.679		
Supply Chain Agility	KRP1	0.852	0.894	0.585
	KRP2	0.709		

	KRP3	0.716		
	KRP4	0.786		
	KRP5	0.740		
	KRP6	0.778		
Company performance	KP1	0.720	0.777	0.538
	KP2	0.693		
	KP3	0.785		

From the table above, it can be seen that all indicators or statement items for the variables Supply Chain Digitalization, Supply Chain Integration, Supply Chain Agility, and Company Performance have a loading factor value of ≥ 0.50 , therefore all indicators or statement items are declared valid.(Haryono, 2016: 110). From the table above, it can also be seen that the variables of Supply Chain Digitalization, Supply Chain Integration, Supply Chain Agility, and Company Performance have a Construct Reliability value of ≥ 0.70 and a Variance Extracted value of ≥ 0.50 , which indicates that the variables are reliable (Haryono, 2016: 59).

Goodness of Fit Indices Results

The model feasibility test is used to test the suitability of the model used in the study. The test is carried out to determine the Goodness of Fit value. Goodness of Fit is used to assess the feasibility of the structural model. If the value of the Goodness of Fit produced is good, then the model can be accepted. The following are the results obtained from the Goodness of Fit Indices Results.

Table 7.
Goodness of Fit Indices Results

Goodness of Fit Indices	Results	Cut-Off Value	Information
Chi Square (df=113, $\alpha=0.05$)	196,628	≤ 138.81 (Chi-Square table)	Not Fit
Probability	0,000	≥ 0.05	Not Fit
GFI	0.833	≥ 0.90	Marginal Fit
AGFI	0.774	≥ 0.90	Not Fit
CFI	0.908	≥ 0.90	Good Fit
TLI	0.890	≥ 0.90	Marginal Fit
RMSEA	0.086	≤ 0.08	Marginal Fit
RMR	0.037	≤ 0.05	Good Fit

Source: (Haryono, 2016: 76)

Based on the table above, it can be concluded that the model in the study is fit, the model is said to be feasible if at least one of the model feasibility test methods is fulfilled (Haryono, 2016: 66). There are two feasibility tests for a good fit model, namely CFI and RMR so that the model meets good goodness of fit.

Correlation Test Results

Table 8.
Correlation Test Results

	Estimate
DRP <--> IRP	0.863
DRP <--> KRP	0.540
DRP <--> KP	0.654
IRP <--> KRP	0.617
IRP <--> KP	0.799
KRP <--> KP	0.709

Based on the table above, it can be seen that the correlation coefficient value of the Supply Chain Digitalization (DRP) variable with the Supply Chain Integration (IRP) variable is 0.863, which is positive, indicating that the Supply Chain Digitalization (DRP) variable with the Supply Chain Integration (IRP) variable has a positive relationship.

The correlation coefficient value of the Supply Chain Digitalization (DRP) variable with the Supply Chain Agility (SCA) variable is 0.540, which is positive, indicating that the Supply Chain Digitalization (DRP) variable with the Supply Chain Agility (SCA) variable has a positive relationship.

The correlation coefficient value of the Supply Chain Digitalization (DRP) variable with the Company Performance (KP) variable is 0.654, which is positive, indicating that the Supply Chain Digitalization (DRP) variable with the Company Performance (KP) variable has a positive relationship.

The correlation coefficient value of the Supply Chain Integration (SCA) variable with the Supply Chain Agility (RCA) variable is 0.617, which is positive, indicating that the Supply Chain Integration (SCA) variable with the Supply Chain Agility (RCA) variable has a positive relationship.

The correlation coefficient value of the Supply Chain Integration (IRP) variable with the Company Performance (KP) variable is 0.799, which is positive, indicating that the Supply Chain Integration (IRP) variable with the Company Performance (KP) variable has a positive relationship.

The correlation coefficient value of the Supply Chain Agility (SCA) variable with the Company Performance (CP) variable is 0.709, which is positive, indicating that the Supply Chain Agility (SCA) variable with the Company Performance (CP) variable has a positive relationship.

Structural Model Test

In the SEM model, the measurement model and the parameter structural model are estimated together and must meet the demands of the fit model, therefore the model must be based on a strong theory. The results of the estimation and fit model of the step approach to SEM using the Lisrel application program can be seen in the table below:

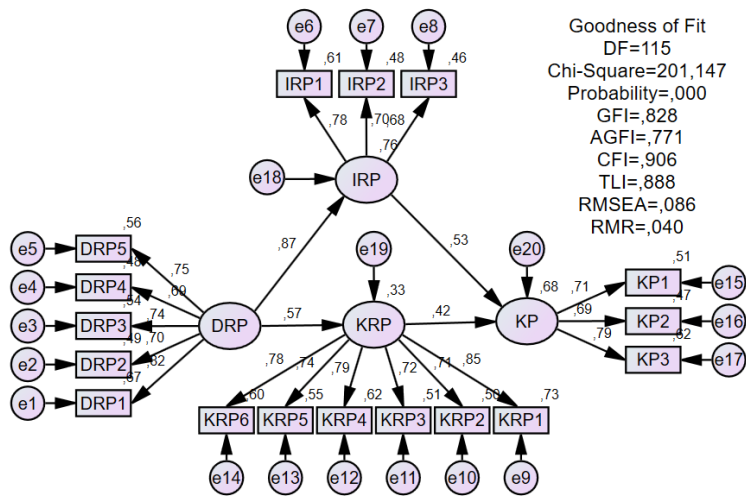


Figure 2.
Structural Model

Validity and Reliability Test Results

Table 9.
Validity and Reliability Test Results

Variables	Indicator	Loading Factor	Construct Reliability	Variance Extraction
Supply Chain Digitalization	DRP1	0.820	0.859	0.551
	DRP2	0.701		

	DRP3	0.738		
	DRP4	0.693		
	DRP5	0.751		
Supply Chain Integration	IRP1	0.779	0.762	0.517
	IRP2	0.695		
	IRP3	0.678		
Supply Chain Agility	KRP1	0.852	0.894	0.586
	KRP2	0.710		
	KRP3	0.716		
	KRP4	0.786		
	KRP5	0.742		
	KRP6	0.778		
Company performance	KP1	0.713	0.775	0.535
	KP2	0.689		
	KP3	0.788		

From the table above, it can be seen that all indicators or statement items for the variables Supply Chain Digitalization, Supply Chain Integration, Supply Chain Agility, and Company Performance have a loading factor value of ≥ 0.50 , therefore all indicators or statement items are declared valid (Haryono, 2016: 110). From the table above, it can also be seen that the variables of Supply Chain Digitalization, Supply Chain Integration, Supply Chain Agility, and Company Performance have a Construct Reliability value of ≥ 0.70 and a Variance Extracted value of ≥ 0.50 , which indicates that the variables are reliable. (Haryono, 2016: 59).

Goodness of Fit Indices Results

Table 10.
Goodness of Fit Indices Results

	Estimate
IRP	0.755
KRP	0.327
KP	0.684

Based on the table above, it can be seen that the R Square value of the Supply Chain Integration (IRP) variable is 0.755 or 75.5%, this value shows that the Supply Chain Digitalization (DRP) variable is able to explain the Supply Chain Integration (IRP) variable

by 75.5%, while the remaining 24.5% (100 - R Square value) is explained by other variables that are not included in this research model (Haryono, 2016: 150).

The R Square value of the Supply Chain Agility (SCA) variable is 0.327 or 32.7%, this value indicates that the Supply Chain Digitalization (DRC) variable is able to explain the Supply Chain Agility (SCA) variable by 32.7%, while the remaining 67.3% (100 - R Square value) is explained by other variables that are not included in this research model.

The R Square value of the Company Performance (KP) variable is 0.684 or 68.4%, this value indicates that the Supply Chain Integration (IRP) and Supply Chain Agility (KRP) variables can explain the Company Performance (KP) variable by 68.4%, while the remaining 31.6% (100 - R Square value) is explained by other variables that are not included in this research model.

Hypothesis Test Results

Table 11.
Hypothesis Test Results

	Estimate	SE	CR	P	Label
IRP <--- DRP	0.809	,111	7,272	***	par_13
KRP <--- DRP	0.614	,117	5,265	***	par_15
KP <--- IRP	0.453	,109	4,173	***	par_14
KP <--- KRP	0.308	,084	3,668	***	par_16

Supply Chain Digitalization towards Supply Chain Integration

Based on the table above, it can be seen that the path of supply chain digitalization towards supply chain integration in Tangerang Regency MSMEs obtained a positive coefficient value of 0.809 with a CR value of $7.272 \geq 1.96$ or a p-value of $0.000 \leq 0.05$, so H1 is accepted, meaning that supply chain digitalization affects supply chain integration (Haryono, 2016: 245).

Supply Chain Digitalization Towards Supply Chain Agility

This study produces a value that the agility of the supply chain on company performance is obtained by a positive coefficient value of 0.308 with a CR value of $3.668 \geq 1.96$ or a p-value of $0.000 \leq 0.05$, then H4 is accepted, meaning that supply chain agility affects company performance.

Supply Chain Integration on Company Performance

Based on the calculations, a positive coefficient value can be obtained, namely 0.453 with a CR value of $4.173 \geq 1.96$ or a p-value of $0.000 \leq 0.05$, so H3 is accepted, meaning supply chain integration affects company performance.

Supply Chain Agility on Company Performance

This study produces a value that the agility of the supply chain on company performance is obtained by a positive coefficient value of 0.308 with a CR value of $3.668 \geq 1.96$ or a p-value of $0.000 \leq 0.05$, then H4 is accepted, meaning that supply chain agility affects company performance.

CONCLUSION

Based on the results of the research that has been conducted to analyze the influence of supply chain digitalization on integration and agility on company performance, it can be concluded that there is a positive influence on the variables of supply chain digitalization on supply chain integration, supply chain digitalization on supply chain agility, then supply chain integration on company performance and supply chain agility on company performance.

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