

## Developing Supply Chain to Increase Firm Performance: The Role of Supply Chain Agility, Supply Chain Integration and Supply Chain Quality Management

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Keyword	Abstract
Supply Chain Agility, Supply Chain Integration, Supply Chain Quality Management.	<p>The objective of this study was to analyze the effect of supply chain agility (SCA), supply chain integration (SCI) and supply chain quality management (SCQM) on the performance of online food seller companies. This research is quantitative research with a structural equation model methodology using AMOS. This study uses a population of companies or culinary business people who sell their products online in West Java, Indonesia. From this population, 160 online culinary businesses were selected as samples in this study. This study resulted that SCA, SCI and SCQM can have a positive and significant effect on company performance. Online culinary companies should increase supply chain agility through the development of several aspects within the company, namely demand management, agile distribution, agile manufacturing and agile customization. The results fill the gap in previous research by analyzing the influence of supply chain agility, supply chain integration and supply chain quality management on company performance in the culinary industry. It is hoped that this research can provide input and study the role of the supply chain in improving company performance.</p>

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### I. INTRODUCTION

The tight competition encourages culinary businesses to continuously innovate (Haefner et al. 2021; Leonidou et al. 2020). One of the culinary business innovations that has succeeded in attracting many consumers and even becoming a new lifestyle for the community is ordering food online (Guine et al. 2020; Huang & Tsai, 2021). Online food ordering services have significantly increased the demand for businesses in the culinary industry. Improving company performance in industries with intense competition and high business disruption is certainly not easy (Gavilan et al. 2021; Ali et al. 2020).

The amount of demand must be balanced with the company's strong supply chain management (Hoobs, 2020; Thilmany et al. 2021). Some literature reveals 3 aspects of supply chain that must be owned by companies in industries with intense competition and high disruption, namely supply chain agility (Bargshady, et al, 2016; Guner., et al, (2018);Hwang & Kim, (2018); Jakhar

& Barua (2013); Khan, & Wisner, (2019); Macclever, et al, (2017) supply chain integration (Kumar & Kushwaha. (2018); Ali, et al. (2017); Flynn, et al (2010) Tan, et al (2017) and supply chain quality management (Hanf & Pieniadz, (2007) ; Gu, et al, (2017) ; Soares, et al. (2012); Zeng et al. (2013) ; Zhong et al (2016).

Supply chain agility is formed from the company's agility in managing demand, distribution, production to customization. While supply chain integration is the company's ability to build integration with consumers, producers and the company's internal. Both aspects will be complete if combined with supply chain quality management which consists of quality strategy, integration process and relationship management.

However, from some of the literature discussing the effect of supply chain on performance, inconsistencies were found in the results of the analysis, namely research by Khan & Wisner (2019; Muafi & Sulistio, 2022) which found no effect of supply chain agility on performance. Khan & Werner (2019) explained that agility does

not always affect performance. This is based on the condition of the business being run both in terms of internal readiness and external pressure. The inconsistency of the results on the influence of supply chain agility indicates that there is an analytical gap in this topic and this research seeks to fill that gap.

Furthermore, the inconsistency of the analysis results was also found in the effect of supply chain integration by Yu et al. (2019; Zhao et al. 2021) that supply chain integration has no effect on organizational performance. Zhao et al. (2021) explains that supply chain integration is not able to directly affect a company's financial performance. The effect of supply chain integration can have a positive impact on operational performance while financial performance increases due to improved operational performance. These findings indicate that the influence of supply chain integration needs to be discussed further, especially in industries that have rarely been discussed by previous researchers, including the culinary industry.

Therefore, this research seeks to provide novelty and fill the gap in previous research by analyzing the influence of supply chain agility, supply chain integration and supply chain quality management on company performance in the culinary industry. It is hoped that this research can provide input and study the role of the supply chain in improving company performance and provide literacy regarding various types of strategies that can be used in supply chain management.

## II. LITERATURE REVIEW

### Supply Chain Agility

Supply chain agility is a company's ability to manage its internal supply chain and with this management can provide strategic advantages and competitive advantages for companies in the midst of disruptive and changing market conditions (Hwang & Kim, 2018). The implementation of agility includes a number of things including agility in responding to consumer requests, speed in serving consumers, agility and flexibility in adapting to the environment (Gunner et al. 2018).

Supply chains are very important in business because of the demands of a disruptive, unpredictable business environment and intense competition (Khan, 2006; Khan & Wisner, 2019).

Increasing supply chain agility can be done by systematically developing and acquiring capabilities to make supply chains fast, flexible and competitive (Macclever, et al, 2017). Capability in supply chain management must be built through competent human resources, development of technology and information, building extensive networks and collaboration (Gunner et al. 2018).

Currently, the business era is entering industry 4.0 and there are many disruptions, market uncertainties and dynamic environmental conditions that demand companies to be more aggressive and agile. Therefore companies need to emphasize supply chain agility which is a driver of company agility (Swafford., (2006). Several previous studies have shown that supply chain agility can significantly influence company performance Bargshady, et al, (2016); Guner., et al, (2018); Hwang & Kim, (2018); Jakhar & Barua (2013); Khan, & Wisner, (2019); Macclever, et al, (2017).

However, from some of the literature discussing the effect of supply chain on performance, inconsistencies were found in the results of the analysis, namely research by Khan & Wisner (2019; Muafi & Sulistio, 2022) which found no effect of supply chain agility on performance. Khan & Werner (2019) explained that agility does not always affect performance. This is based on the condition of the business being run both in terms of internal readiness and external pressure. The inconsistency of the results in the influence of supply chain agility indicates that there is an analysis gap in the topic. So, this research formulates the hypothesis as follows

**H1: Supply chain agility has positive effect on firm performance.**

### Supply Chain Integration

Supply chain integration is a company's ability to build strategic collaborations to create and develop supply chain systems that are more efficient, fast and able to meet market demands (Ali et al. 2017). On the other hand, Zhao et al. (2020; Flynn et al. 2010) explained that supply chain integration is a company's ability to control economic processes or industrial processes in order to improve company performance and profits. To make business more flexible and adaptive, supply chain integration is one of the main keys and has an influence on improving company performance (Kumar & Kushwaha, 2018; Ali, et al. 2017; Flynn, et al. 2010).

Ali et al. (2017) emphasized that implementing supply chain integration can build better company performance. To build supply chain integration, companies must integrate three parties, namely integration with suppliers, integration with internal companies and integration with consumers (Ali, et al. 2017; Flynn, et al. 2010). These three dimensions can be separated as external integration which includes the integration of consumers and suppliers (Tan, et al (2017) and the company's internal integration. In addition to these three things, supply chain integration also includes information technology and information quality (Kumar & Kushwaha. (2018).

In previous literature regarding the effect of supply chain integration on firm performance, inconsistent results were also found, including research by Yu et al. (2019; Zhao et al. 2021) that supply chain integration has no effect on organizational performance. Zhao et al. (2021) explains that supply chain integration is not able to directly affect a company's financial performance. The effect of supply chain integration can have a positive impact on operational performance while financial performance increases due to improved operational performance. These findings indicate that the influence of supply chain integration needs to be discussed further, especially in industries that have rarely been discussed by previous researchers, including the culinary industry. Therefore, this study formulates the following hypothesis:

**H2: Supply chain integration has positive effect on firm performance.**

### **Supply Chain Management**

Supply chain quality management is supply chain management that focuses on product quality and customer satisfaction (Gu et al. 2017). Supply chain quality management can also be interpreted as a combination of production capabilities and ownership of an extensive distribution network and coupled with market share accuracy to foster customer satisfaction and the best supply chain quality (Hanf & Pieniadz, 2007).

Companies should have strategic concepts in shaping supply chain quality, service quality and product quality to create customer satisfaction (Soares, et al. 2012; Zeng et al. 2013; Zhong et al. 2016). To achieve this level, companies must have a sophisticated network structure and management strategy to build

quality (Gu, et al, 2017; Soares, et al. 2012). Supply chain quality can form a competitive advantage for companies that are the main capital in a disruptive era with intense competition.

Some previous literature found that supply chain quality management can improve company performance (Gu, et al, 2017; Soares, et al. 2012; Zeng et al. 2013; Zhong et al. 2016). Supply chain quality management is a topic that is rarely discussed in previous literature (Kumar et al. 2023; Zhou & Li, 2020). Discussion of supply chain quality management is still focused on industries where the players are large companies such as the retail industry (Kumar et al. 2023) and the manufacturing industry (Zhou & Li, 2020).

On the other hand, analyzes related to the effect of supply chain quality management on firm performance also found inconsistent results as research by Hong et al. (2019) who found that the application of supply chain quality management cannot directly affect performance. This is because companies still have to ensure that the supply chain process is running well, then they can implement supply chain quality management that focuses on consumers. Therefore, this study formulates the following hypothesis:

**H3: Supply chain quality management has positive effect on firm performance.**

### **III. RESEARCH METHOD**

This research is quantitative research with a structural equation model methodology using AMOS software. The use of the SEM method was carried out to build a better causal model with reference to the goodness of fit value that was carried out. On the other hand, the SEM method is a novelty that is proposed in the analysis of 3 types of supply chains in one research model. This study uses a population of companies or culinary business people who sell their products online in West Java, Indonesia. From this population, 160 online culinary businesses were selected as samples in this study. The data in this study were obtained by distributing questionnaires to all respondents with an answer scale of 1-5. Furthermore, this study analyzes 3 hypotheses formulated from 4 research variables, namely supply chain agility, supply chain integration and supply chain quality management. The operational variable definitions used in this study are as follows:

1. Supply chain agility: a company's ability to manage its internal supply chain and

with this management can provide strategic advantages and competitive advantages for companies in the midst of disruptive and changing market conditions (Hwang & Kim, 2018). The measurement of supply chain agility is as follows (Rajesh. (2008).) :

- 1) Demand Management And Distribution : (a) The ability of the supply chain to exchange information quickly; (b) Supply chain's ability to predict changes quickly; (c) Supply chain capabilities are adjusted to supplier delivery schedules; (d) The ability of the supply chain to rapidly reduce inventory; and The ability to quickly reduce the order cycle time to delivery.
- 2) Manufacturing And Customization: (a) The ability of the supply chain to quickly reduce installation costs; (b) The ability of the supply chain to quickly reduce installation times; (c) The ability to quickly reduce product development cycle times; (d) The ability to quickly reduce manufacturing time; (e) The ability to rapidly improve the capabilities of the manufacturing process; and Ability to adjust quickly with customization.

2. 2. Supply chain integration: Firm ability to build strategic collaborations to create and develop supply chain systems that are more efficient, fast and able to meet market demands (Ali et al. 2017). Measurement of supply chain integration includes several aspects adapted from Soares et al. (2012) namely a). the company bridges and facilitates cooperation in supply chain management with other companies, b). supply chain management within the company can encourage an increase in the company's consumers, c). Companies are increasing integration to build better supply chain management (d) The firm builds better

level of trust among the members of the supply chain. (d) The firm includes all members of the supply chain in a product, service and marketing plan (e) The firm participates in supplier decision-making. (f) The company is looking for new ways to integrate supply chain activities, (g) The company is helping suppliers to improve their capabilities.

3. 3. Supply chain quality management: Supply chain management that focuses on product quality and customer satisfaction (Gu et al. 2017). The measurements are as follows (Hong, Liao, Zhang & Yu, ((2019): 1) Quality strategy and leadership: (a) The company is able to deliver supply chain quality management plans regularly and accurately, (b) The company is able to respond to quality problems quickly, (c) Quality management practices in all parts of the company. 2) Process Integration and Management: (a) Has a partner in building quality, (b) Supply chain management is able to overcome quality problems in the company, (c) Have clear progress in building quality. 2) Supply Chain Relationship Management: (a) Partners in building quality always provide good input, (b) Selecting supply chain partners strictly, (c) Possess and guarantee skills and knowledge in building quality.
4. 4. Firm Performance: Company performance is the company's achievements from financial and non-financial aspects which have a positive impact and are able to develop the company according to the expected goals. The measurements are as follows (Beheshti, Mostaghel and Hultman, 2014: Ashraf, et al, 2020): (a) The company can make efforts to reduce costs, (b) Higher return on capital, (c) Increased sales, (d) Assets have better rate of return

(Comparison of income and assets continues and increasing), ( e) The company has good cash flow (cash), (d) Net profit increases.

#### IV. RESULT AND DISCUSSION

##### RESULT

##### Normality Test and Outlier

In testing using the SEM method, it is required that the data meet the normality criteria and be free from outlier data. The normality test refers to the CR value in the assetment of normality table. Data that is normally distributed has multivariate CR values between the range - 2.58 – 2.58. The results of the analysis showed a value of 0.905 which fulfilled the normality criteria, so that the data in this study were normally distributed.

Furthermore, outlier testing is used to analyze the presence or absence of outlier or deviating data. The outlier test refers to the mahalanobis distance table and must meet the criteria for a mahalanobis d-square value that is smaller than the chi-square value with a degree of freedom of 35, namely 57.34. The results of the outlier test are shown in table 1.

Table 1. Outlier

Observation number	Mahalanobis d-squared		p1	p2
93	55,148	,016	,929	93
80	54,604	,018	,797	80
126	52,439	,029	,851	126
14	51,885	,033	,775	14

The results of the analysis showed that none of the d-square mahalanobis values exceeded 57.34 so it can be concluded that all data were free from outliers.

##### Validity Test

The next test is the validity of the indicator. The validity of the indicators is carried out to find out whether the data from the questionnaire collection can explain the indicators properly or not. The criteria in the test refer to the loading factor value provided that the loading factor value is  $> 0.5$  (Hair et al. 2010). The results of the analysis are shown in table 2.

Table 2. Loading Factor

Indicators	Loading Factor	Validity
SA5	0,78	Valid
SA4	0,684	Valid
SA3	0,747	Valid
SA2	0,722	Valid
SA1	0,835	Valid
SA11	0,775	Valid
SA10	0,842	Valid
SA9	0,755	Valid
SA8	0,582	Valid
SA7	0,6	Valid
SA6	0,66	Valid
SI9	0,856	Valid
SI8	0,835	Valid
SI7	0,744	Valid
SI6	0,753	Valid
SI5	0,714	Valid
SI4	0,805	Valid
SI3	0,76	Valid
SI2	0,737	Valid
SI1	0,677	Valid
SQM3	0,789	Valid
SQM2	0,787	Valid
SQM1	0,779	Valid
SQM6	0,781	Valid
SQM5	0,797	Valid
SQM4	0,757	Valid
SQM9	0,787	Valid
SQM8	0,791	Valid
SQM7	0,819	Valid
FP1	0,653	Valid
FP2	0,757	Valid
FP3	0,757	Valid
FP4	0,753	Valid
FP5	0,692	Valid
FP6	0,702	Valid

Table 2 shows that all indicators in this study have a loading factor value of  $> 0.5$  so it can be concluded that all indicators in this study can be categorized as valid.

### Confirmatory Factor Analysis

In confirmatory SEM, the analysis was carried out by testing the goodness of fit value of the research model. The goodness of fit test is a test of whether a research model is feasible or not. The feasibility of the model uses several criteria which are divided into 3 types, namely absolute fit indices, incremental fit indices and parsimony fit indices. From the 3 types of GOF criteria, Hair et al, (2010) require 2 criteria to represent each type of GOF. For Absolute fit RMSEA and CMINDF were used, incremental fit was using TLI and CFI and parsimony fit was using PGFI and PNFI. The results of the analysis are shown in table 3.

**Table 3. Goodness of Fit (GOF)**

GOF	Criteria	Cut-off value	
RMSEA	0.08	0.098	Marginal fit
CMINDF	2,00	2,538	Marginal fit
TLI	0.90	0.820	Marginal fit
CFI	0.90	0.802	Marginal fit
PGFI	0.60	0.623	Fit
PNFI	0.60	0.672	Fit

From the results of the modification, it was found that all the criteria for goodness of fit had been met. So it can be concluded that this research model is fit.

### Reliability Test

The next test is a reliability test that aims to test the reliability of a variable in explaining the case or phenomenon being analyzed. The reliability test in AMOS can be known by the CR (Construct reliability) and VE (Variance Extracted) values. The results of the reliability test are shown in table 4.

**Table 4. Reliability Test**

Variabel	CR	VE
SCA	0,7	0,5
SCI	0,8	0,5
SCQM	0,8	0,6
FP	0,7	0,5

The criterion in reliability testing is the CR value in a reliable variable that has a value of > 0.7 while VE has a value of > 0.5. The results of the analysis in table 4 show that all the variables in this study have met the criteria so that the variables in this study are reliable.

### Hypothesis Test

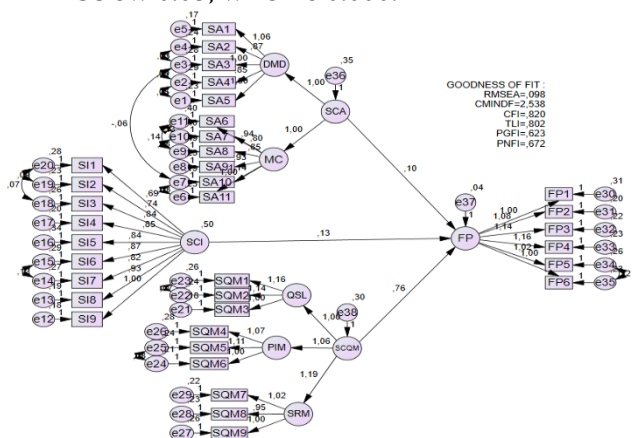
The next test is testing the hypothesis in research. This study analyzes 3 hypotheses which in general state that there is an effect of supply chain agility, supply chain integration and supply chain quality management on company performance. The analysis was carried out by the SEM method using AMOS software. The results of the analysis are shown in table 5.

**Table 5. Hypothesis Test**

		Estimate	S.E.	C.R.	P	
FP	<--	SCA	,096	,044	2,198	,028
FP	<--	SCI	,131	,038	3,461	,000
FP	<--	SCQM	,759	,095	7,956	,000

Hypothesis testing to determine the effect of a variable on other variables. Positive influence is indicated by a positive estimate value. While the significant effect is shown by the t statistic > 1.96 and the p value < 0.05. The results of the analysis are:

1. SCA (Supply Chain Agility) positively and significantly effect on FP (Firm Performance). This is evidenced by a CR value of more than 1.96, 2.198 and a P value that is below 0.05, 0.028.
2. SCI (Supply Chain Integration) positively and significantly effect on FP (Firm Performance). This is evidenced by the CR value of more than 1.96 which is 3.461 and the value of P value that is below 0.05 which is 0.000.
3. SCQM (Supply Chain Quality Management) positively and significantly effect on FP (Firm Performance). This is evidenced by a CR value of more than 1.96, which is 7.956 and a P value that is below 0.05, which is 0.000.



**Figure 1. Full Model Path Diagram**

## Discussion

Culinary companies that sell online have their own challenges, namely supply chain management. From the literature study found 3 types of supply chain that can improve company performance, namely supply chain agility, supply chain integration and supply chain quality management. This study provides results that supply chain agility is able to have a positive and significant influence on company performance. These results indicate that building a supply chain agility is one of the keys to improve company performance Bargshady, et al, 2016; Guner., et al, (2018) : Hwang & Kim, (2018) ; Jakhar & Barua (2013); Khan, & Wisner, (2019) ; Macclever, et al, (2017).

However, the results of the H1 analysis contradict several studies by Khan & Wisner (2019; Muafi & Sulistio, 2022) which found no effect of supply chain agility on performance. Khan & Werner (2019) explained that agility does not always affect performance. This is based on the condition of the business being run both in terms of internal readiness and external pressure. From the results of the analysis it was found that the internal and external conditions of the companies in the culinary industry that were analyzed support the role of supply chain agility, so that this capability must be developed.

Online culinary companies are expected to be able to increase supply chain agility by building several aspects within the company, namely demand management, agile distribution, agile manufacturing and agile customization. Furthermore, this research also results that supply chain integration can have a positive and significant influence on company performance. These results are supported by several previous studies which also revealed that supply chain integration has a significant role on company performance (Kumar & Kushwaha. (2018); Ali, et al. (2017); Flynn , et al (2010). Tan, et al (2017); Barua et al (2020).

In the context of online culinary companies, companies are expected to be able to build supply chain integration through building integration between companies and consumers, companies with suppliers and integration within the company. Akan tetapi hasil analisis H2 bertentangan dengan temuan oleh Yu et al. (2019; Zhao et al. 2021) bahwa supply chain integration tidak berpengaruh pada kinerja organisasi. Zhao et al. (2021) menjelaskan bahwa supply chain integration tidak mampu secara langsung

berpengaruh pada kinerja finansial perusahaan. Pengaruh supply chain integration dapat berdampak positif pada kinerja operasional sedangkan kinerja finansial meningkat akibat membaiknya kinerja operasional.

On the other hand, this research also results that supply chain quality management is also able to have a positive and significant influence on company performance. The results of this study are also supported by previous research and strengthen that supply chain quality management is able to encourage companies to continue to improve performance (Hanf & Pieniadz, (2007); Gu, et al, (2017) ; Soares, et al .(2012);Zenget al.(2013);Zhong et al.(2016).Proven significant influence of supply chain quality management on company performance requires companies to be able to create supply chain quality management through quality strategy and leadership, process integration and management and supply chain relationship management.

## V. CONCLUSION

This study analyzes the effects given by supply chain agility, supply chain integration and supply chain quality management on company performance and results that: (1) Supply chain agility is able to provide a positive and significant impact on company performance. (2) Supply chain integration is able to provide a positive and significant impact on company performance, (3) Supply chain quality management is able to provide a positive and significant impact on company performance.

### Managerial Implication

The results of this research have several managerial implications for culinary companies that sell online related to supply chain management. First, the results of this study suggest online culinary companies to improve supply chain agility through building several aspects within the company, namely demand management, agile distribution, agile manufacturing and agile customization. Second, this research suggests online culinary companies to build supply chain integration through building integration between companies and consumers, companies with suppliers and integration within the company. Third, this research suggests online culinary companies to build supply chain quality management through building quality strategy and leadership, process integration and

management and supply chain relationship management.

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