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ABSTRACT

The aim of this paper is to analyse the effects of supply chain agility on firm performance and the role of demand stability in this relationship. Within the scope of the research, by establishing a SEM (structural equation modelling), effects of supply chain agility and demand stability on firm performance were investigated. In addition, the effect of supply chain agility on demand stability is also observed. Analyzes have shown that during COVID-19 pandemic period, supply chain agility positively affects demand stability and firm performance. In addition, demand stability has positively affected firm performances. The mediating role of demand stability was analysed with the Process Macro method and its moderating effect was analysed with multiple regression. Analysis results showed that demand stability has a mediating role in the effect of supply chain agility on firm performance, but it doesn't have a moderating role.

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Supply chain agility; demand stability; financial performance; structural equation modelling; COVID-19

Introduction

In today's market where the world is accepted as a global village, the extremely competitive environment created by globalisation has also brought risks for companies, especially in terms of demand. As a result of rapid globalisation, wars, crises and epidemics that broke out in a country are spreading across the world rapidly. The spreading rate of the COVID-19 crisis, which has affected the whole world for over the last 1 year, can be evaluated as the result of globalisation as well. Due to the pandemic, all countries, firstly China, went to shut down, production lines stopped, and deliveries could not be completed properly. Due to such an important epidemic worldwide which causes panic, fear and chaos, not only the social lives of people, but also the economy and other markets are affected in a way rarely seen throughout history (Çütcü and Kilic 2020, 219; Ames, Coyne, and Stice 2020, 181). COVID-19 pandemic has greatly disrupted supply chains on a global and local basis, by causing supply problems and various problems. (Pujawan and Bah 2022, 81). Considering the situation in more detail, there have been great changes in consumer demands, hygiene products, dry foods, toilet papers, protective masks have been and are still in demand as never before which has caused supply shortages for some products and distortions in global supply chains (Karabag 2020, 2). Consequently, in this period, most companies faced unprecedented series of shocks caused by the COVID-19 such as shortage in material supply, a decrease in both global and national demand for products and services, and accordingly difficulties in payments which is quite unlike any seen in recent times (Currie et al. 2020; Ivanov 2020; Robinson and Kengatharan 2020, 122; Sarkis et al. 2020). Variables such as increasing capacity, technological changes and market conditions make it mandatory for supply chain managers to consider all these conditions in the strategic decision-making process (Babai, Boylan, and Rostami-Tabar 2022). In order to compensate these demand uncertainties in both domestic and foreign markets and the emergence of risks in the supply chain, companies are trying different strategies. One of these strategies especially for manufacturing companies is to have an agile supply chain. The COVID-19 pandemic showed companies that an agile supply chain is necessary to meet the unstable customer demand and the necessity for great variety (Agarwal, Shankar, and Tiwari 2007; Ivanov 2020). And they also need a structure that can control the demand risk well in order to reduce the negative effects of the risks and uncertainties caused by such unpredicted realities (Chen and Seshadri 2006; Sodhi 2005). Also companies are required to increase their firm performance in order to survive in such a competitive environment (Ma 2000; Potjanajaruwit 2018; Yang and Zhao 2014). Increasing firm performance is possible through supply chain agility (Bargshady et al. 2016; Ayoub and Abdallah 2019; Gligor and Holcomb 2012). Managers often need flexibility and efficiency. Understanding customers to create value requires an emphasis on agility and flexibility of processes. Companies continue

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to struggle to respond to supplier and customer demand changes, resulting in a lack of agility (Akram, El Korchi, and Amine Balambo 2021).

In this study it is aimed to examine the effect of supply chain agility of companies on firm performance during the COVID-19 pandemic. In addition, the demand stability variable has been included in the study in order to take into account the changes in the demand caused by the pandemic. Accordingly, the mediating effect of demand stability in the relationship between supply chain agility and firm performance will be analysed. In such a direction, the theoretical structure of the study will be formed by first explaining the supply chain agility, and then the demand stability. Afterwards, it will be tried to reveal the relationship between the data obtained and the selected variables.

Literature review and development of research hypotheses

Supply chain agility (SCA) has emerged as an important capability to stay competitive against competitors in this uncertain business environment (Sharma et al. 2017, 532). Supply chain agility, which is the independent variable of the study, is related to the capability of companies to estimate and quickly respond to demand variances (Yıldız and Çetindaş 2019, 880). SCA is seen as a tool that helps companies gain competitive advantage (Kuo-Jui et al. 2017, 96). Manufacturing companies have recognised for a long time that capabilities such as flexibility and agility are important for potential competitiveness. An agile supply chain is very important to companies as implementing a particular supply chain flow pattern has enormous consequences, especially in a competitive environment encountered in product mix as well as unexpected and sudden changes in product (Hasan, Sarkis, and Shankar 2012, 906). This fact was once again seen during the COVID-19 pandemic. Sudden changes occurred in both production processes and consumer demands. Manufacturers who can adapt to these changes will survive through the pandemic period by managing the demand instability. Companies with these characteristics can cope with increasing environmental uncertainty and adapt to the speed of change in today's markets (Giachetti et al., 2003, p. 47). Thus, many companies have realised that it is necessary to have a strategy to react quickly and cost effectively to sudden updates in customer demands as in the COVID-19 period which will provide more stability in demand and firm performance (Johansen 2020, 57; Hu and Zhang 2021; Shen et al. 2020). Because it is not possible for businesses that want to survive in a global competitive environment to ignore customer needs (Aksoy and Cengiz 2016). Therefore, supply chain agility will increase demand stability and accordingly firm performance especially in the COVID-19 pandemic period. The use of agility will benefit all supply chain parties (Ben Naylor, Naim, and Berry 1999, 117).

The performance of a company is mainly explained by its success over a certain period of time (Al-Matari, Al-Swidi, and Fadzil 2014, 25). Firm performance is the results obtained by the company by moving its competitive strategies and resources in harmony in order to achieve certain goals that the company has determined beforehand or revised later, or the gains it provides during the implementation process (Çalık, Altunışık, and Sütütemiz 2013, 143). Firm performance refers to the degree to which company strategies achieve their goals at the end of a certain period, in other words, the success level of the company (Porter 1991). Firm performance is closely related to the level of achieving its basic economic goals, as well as the indicator of the ability of the company to adapt to changing environmental conditions and the success of innovation in the sustainability of its competitive presence (Bulut, Yılmaz, and Alpkan 2009). In previous studies, performance was measured through financial indicators that reflect the historical position of the business. Therefore, financial performance has been the focus of studies. However, later on, it was realised that financial indicators do not produce information about the long-term performance of the enterprise, and non-financial performance indicators were brought to the fore (Keskin, Zehir, and Ayar 2016, 115).

On the other hand, in order to explain the concept of demand stability, which is considered as the mediator and moderator variable of the study, and which has not been clearly defined before in the literature, it will be useful to consider the concepts of demand risk and demand uncertainty which could be considered as the opposite of demand stability. The most important purpose of companies in making demand planning for the future is to reduce the risks. Uncertainties and risks are the most important factors that make the planning processes of companies difficult (Luce 1999, 3). Only in environments where demand is more stable, the whole process from the first supplier to the last customer can be more planned and predictable. It is possible to decrease or even eliminate the negative impacts of supply chain flaws on firm performance by ensuring demand stability. Demand stability itself also can be possible by identifying risky situations among the supply chain and developing ways to minimise these risks. Risks can be internal sourced which is under company's control or external (environmental) sourced which cannot be controlled (Elahi 2013, 12). Demand risk is one of the environmental risks in the supply chain which means unpredictability, misunderstanding customers or risks caused by final customer demand (Business Queensland 2017). Demand risk arises due to uncertainties in the

market as observed in the COVID-19 period. These uncertainties prevent companies from making long-term plans and production (Demirkol, Ünğan, and Ayanoğlu 2015, 24). Demand uncertainty, which is another concept that will help explain demand stability, may result from demand volatility or erroneous demand forecast, process or production uncertainty, production process disruption, and supply uncertainty (Jung and Jeong, 2011, p. 5415; Peidro, 2009). Demand uncertainty is evaluated in two ways as short term and long term uncertainty. Short-term uncertainties refer to variations such as cancellation, replacement and failure in daily orders. Long-term uncertainties refer to fluctuations in raw materials, final products, prices, seasonal demand changes and changes in longer time frames (Gupta and Maranas, 2003, p. 1220). In the absence of risk and uncertainty, it is possible to say that demand is stable. Accordingly, demand stability, which is a new term in the literature, will be discussed in this study under the effect of COVID-19 pandemic.

Relationship between supply chain agility and firm performance

Companies achieve competitiveness by responding to different customer requests in various markets in the shortest and at the right time. Achieving this competitive advantage depends on how much agility can be applied by companies in the supply chain. Therefore, companies should plan their supply chain agile in order to compete with other companies by showing high performance, especially in uncertain environments (Yusuf et al. 2004).

Um et al. (2017) revealed that supply chain agility has a considerable effect on cost efficiency and customer service. Güner (2018, p. i) investigated the effects of agility and technology uncertainty on firm performance in supply chain management and found that supply chain agility has positive effects on firm performance. In addition, Zelbst et al. (2010), considering agility as a production strategy, showed that agile production has a direct positive relationship with the operational performance of the company.

Based on previous studies, this study will also test the effect of supply chain agility on firm performance during COVID-19 pandemic. In this direction, the first hypothesis and relatedly sub-hypotheses of the study were developed as follows:

H1: Supply chain agility significantly affects firm performance positively.

H1a. During COVID-19 pandemic supply chain agility significantly affects customer performance positively.

H1b. During COVID-19 pandemic supply chain agility significantly affects financial performance positively.

The relationship between supply chain agility and demand stability

Christopher (2000) stated that agility is the ability to meet unique customer demands effectively and flexibly. Therefore, supply chain agility is the capability of a company to handle updates in volume and diversity in customer demand. An agile supply chain allows all supply chain's partners to perceive and react as soon as possible to expected or sudden changes (Yang 2014, 104). Supply chain agility is more needed, especially in markets where demand is highly volatile, unpredictable and customers demand a wide variety of products (Kisperska-Moron and De Haan 2011, 132). Wieland and Marcus Wallenburg (2012, 892) argue that the volatility of demand, imbalance and disruptions between supply and demand negatively affect supply chains and require high levels of agility. During COVID-19 period, while the demand for some supply chains (e.g. face masks, hand sanitiser) has increased greatly, the supply has not been sufficient to meet this demand. For other supply chains (such as the automotive industry), demand and supply declined at the opposite rate, causing production to cease or even bankruptcy risk (Ivanov 2020). In other words, it is a period in which there is no demand stability, relatedly forecasting and planning are managed differently compared to other times (Nikolopoulos et al. 2021). Moreover, increased sourcing globally has resulted in longer lead times for many products, making supply chains increasingly more flexible (Babai and Moon (2011, 2). Therefore, the importance of the agile supply chain becomes more evident in such crisis periods when there is no demand stability. Therefore, agility is essential to be able to quickly adjust supply chain configuration and processes in crisis situations.

Since ensuring supply chain agility will reduce uncertainty in demand, and considering the relationships between supply chain agility and demand risk in previous studies, it is understood that there is an opposite relationship between supply chain agility and demand risk. Demand stability is possible by minimising or eliminating demand uncertainty. One result of companies setting up their supply chains more agile is that demand is perceived less uncertain, that is, stable. In other words, agility will reduce demand uncertainty and provide a more stable perception of demand. Therefore, this study will test the effect of supply chain agility on demand stability during COVID-19 pandemic. In this direction, second hypothesis was developed as follows:

H2: During COVID-19 pandemic supply chain agility significantly affects demand stability positively.

Relationship between demand stability and firm performance

Demand risks can arise from uncertainty caused by customers' unpredictable demands (Nagurney et al. 2005, 122). Disruptions are caused by a mismatch between a company's predictions and actual demand and poor supply chain coordination. Demand stability implies the opposite situation, that is, the demand is clear and the estimated demand is in line with the actual demand. For this reason, demand risk literature should be utilised in explaining demand stability. Because, the opposite effects of demand risk are expected from demand stability. Wagner and Bode (2008)'s study examining the demand risk effects on supply chain performance found a negative effect between two variables. Therefore, it would not be wrong to expect that demand stability will have a similar positive effect. On the other hand, Ağca and Buran (2018) concluded there is no direct effect of demand risk on supply chain demand responsiveness.

Besides, many supply chain elements that affect firm performance have been revealed by various researchers (Al-Shboul et al. 2017; Singh and Sohani 2011; Ou et al. 2010). Considering the effects of instability in demand during the COVID-19 pandemic period on firm performance (Hu and Zhang 2021; Shen et al. 2020) this study will test the effect of demand stability on firm performance during COVID-19 pandemic. In this direction, third hypothesis and relatedly sub-hypotheses were developed as follows:

H3: During COVID-19 pandemic demand stability significantly affects firm performance positively.

H3a. During COVID-19 pandemic demand stability significantly affects customer performance positively.

H3b. During COVID-19 pandemic demand stability significantly affects financial performance positively.

The mediating and moderating role of demand stability

Sharing information about demand-side changes from the marketing and sales department and supply-side changes from the purchasing department play a critical role in organisational analysis (Jajja, Chatha, and Farooq 2018, 122). In the literature related to demand stability, there is no study in terms of mediating and moderating effect since it is a new concept for the literature. But the moderating effect of demand uncertainty which can be seen as the opposite of demand stability, has been examined in different models. For example, the studies belong to O'Leary-Kelly and Flores (2002) on the relationship between marketing-sales planning decision integration and perceived profitability, Fynes, Burca, and Marshall (2004) on the relationship between supply chain relationship quality and supply chain performance, and Boon-itt, Wong, and Jonsson (2011) on the relationship between supplier and internal integration and customer delivery performance has proved the moderating effect of demand uncertainty. Germain, Claycomb, and Dröge (2008) found that in environments where demand is unstable, inter-unit integration affects supply chain process variability and leads to an increase in financial performance. Accordingly, it is thought that demand stability will have a moderating effect in the model of this study.

Based on previous studies, the fourth and fifth hypothesis of the study was developed as follows:

H4: Demand stability has a mediating role in the effect of supply chain agility on firm performance during the COVID-19 pandemic.

H5: Demand stability has a moderating role in the effect of supply chain agility on firm performance during the COVID-19 pandemic.

Methodology

This study aims to investigate the effects of supply chain agility on customer performance and financial performance, which are considered as dimensions of firm performance, and to examine how these effects change in environments where demand is stable. In this study, a survey research method was used to reach the analysis data. Surveys allow researchers to gather a significant amount of information about large numbers of people (Aksoy and Cengiz 2016). This research was conducted on manufacturing companies working in Gaziantep Organised Industry. The universe of the study consisted of 543 manufacturers, and the sample of the study consisted of 226 at the 95% confidence level and 5% confidence interval, but due to the COVID-19 pandemic period, data were collected from only 155 companies, and 43 of the collected data were eliminated as they could not be used. In this way, the return rate of the study was 49.55%.

Exploratory and confirmatory factor analysis were performed with the collected data, respectively. A structural equation model (SEM) was established for testing hypotheses with variables created by the validated scales. SEM is useful since it treats the variables as a whole model. Process Macro was used for

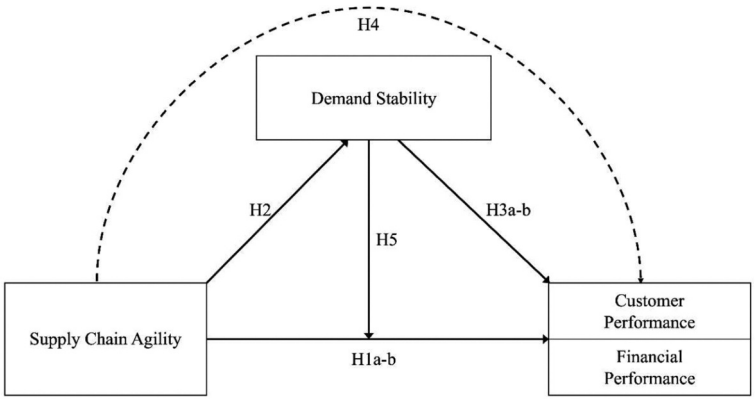

Figure 1. Research model.

the final mediation analysis and SPSS package programme was used for the moderating.

The study model created as a result of the theoretical study and literature research is shown in Figure 1.

As a result of the theoretical research, the hypotheses of the study were established as follows;

H1: Supply chain agility significantly affects firm performance positively.

H1a. During COVID-19 pandemic supply chain agility significantly affects customer performance positively.

H1b. During COVID-19 pandemic supply chain agility significantly affects financial performance positively.

H2: During COVID-19 pandemic supply chain agility significantly affects demand stability positively.

H3: During COVID-19 pandemic demand stability significantly affects firm performance positively.

H3a. During COVID-19 pandemic demand stability significantly affects customer performance positively.

H3b. During COVID-19 pandemic demand stability significantly affects financial performance positively.

H4: During COVID-19 pandemic demand stability has a mediator role as it relates to the impact of supply chain agility on firm performance.

H5: During COVID-19 pandemic demand stability has a moderator role as it relates to the impact of supply chain agility on firm performance.

The supply chain agility scale used in the study was developed by Um et al. (2017) and translated into Turkish by Yıldız and Cetindas (2020). Firm performance scale was determined by using of the following researches by Yıldız and Çetindaş (2019). The scale dimensions considered as financial performance and customer performance, also constitute the two dimensions in the balanced scorecard model developed by Kaplan (1992). The demand stability scale was adapted from Agca and Buran's (2018) demand risk scale. When the items of the scale are examined, it is understood that the statements actually scale the opposite of the demand risk. For this reason, it has been understood that the scale measures the supply chain risk-freeness, i.e. the stability, and the scale is named as supply chain stability.

In the study with the collected data, firstly, normal distribution, reliability, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were applied in order to test the scales' normally distributed, their reliability and construct validity.

The factor loadings of the supply chain agility scale as a result of EFA were found between 0.766 and 0.884. KMO value was obtained as 0.903 and $p < 0.01$. The obtained finding shows the compatibility of the sample size for factor analysis. 68.498% of the total variance is explained by the scale. In consequence of the reliability analysis, the alpha coefficient was obtained as 0.904. As a result of this the value obtained shows that the scale is reliable. In addition, within the scope of the CR> AVE condition, the AVE value was found to be higher than 0.5 and the CR value bigger than 0.7.

Supply chain agility factor loadings and reliability analysis are given in Table 1.

Firm performance factor loadings (EFA) and reliability analysis results are given in Table 2.

As a result of EFA, the firm performance scale is validated within 2 factors. As in Yıldız and Cetindas (2018)'s study, firm performance scale is divided into two factors: customer performance and financial performance. Factor loadings for the financial performance dimension were found between 0.802 and 0.864, and for the customer performance dimension factor loadings were found between 0.765 and 0.864. Since the second item of the scale, " Our company's response time to customer complaints has decreased

Table 1. Supply chain agility factor loadings and reliability analysis.

Items	Factor Loadings	Alfa	KMO	Tot. Var. Exp.
AG1: Our ability to rapidly increase the level of product customisation compared to our competitors …	.884			
AG2: Our ability to rapidly improve delivery reliability compared to our competitors …	.865			
AG3: Our ability to rapidly reduce production time compared to our competitors …	.853			
AG4: Our ability to rapidly improve the level of customer service compared to our competitors …	.837	0.904	0.903	68.498
AG5: Our ability to rapidly reduce delivery time is compared to our competitors …	.801			
AG6: Our ability to rapidly increase our ability to respond to changing market requirements is compared to our competitors …	.780			
AG7: Our ability to rapidly reduce the product development cycle time compared to our competitors …	.766			

Table 2. Firm performance factor loadings and reliability analysis.

Items	Factor Loading 1	Factor Loading 2	Alfa	KMO	Tot. Var. Exp.
FP1: The market share of our company has increased compared to the previous years.	.864				
FP2: The profitability of our company has increased compared to the previous years.	.860				
FP3: The return on investments of our company has increased compared to the previous years.	.805				
FP4: The sales of our company have increased compared to the previous years.	.802		0.908	0.864	72.755
CP1: In terms of our customers, the reliability of our products has increased compared to previous years.		.864			
CP2: Customers' loyalty to our company has increased compared to previous years.		.841			
CP3: Customers' loyalty to our brands has increased compared to previous years.		.781			
CP4: The customer satisfaction of our company has increased compared to the previous years.		.765			

compared to previous years" reached low factor load, it is excluded from the analysis. KMO value was obtained as 0.864 and $p < 0.01$. The obtained finding shows the compatibility of the sample size for factor analysis. The scale explained 72.755% of the total variance. In consequence of the reliability analysis, the alpha coefficient was obtained as 0.908. The value obtained shows that the scale is reliable. In addition, within the scope of the CR> AVE condition, the AVE value was found to be higher than 0.5 and the CR value was higher than 0.7.

The results of the Demand Stability factor loadings and reliability analyzes are given in Table 3.

As a result of EFA, factor loads of the Demand stability Scale were found between 0.719 and 0.884. The first item of the scale, "There are no unexpected changes and fluctuations in our customer demands" and the last item, "Our customers provide reliable estimates of their own demands" are excluded from the analysis because the factor load is very low as a result of the CFA analysis. KMO value was obtained as 0.849 and $p < 0.01$. The findings show that the sample size is compatible for factor analysis. The scale also explained 62.603% of the total variance. The reliability analysis showed that the alpha coefficient was obtained as 0.900. The value obtained shows that the scale is reliable. In addition, within the scope of the CR> AVE condition, the AVE value was found to be higher than 0.5 and the CR value was higher than 0.7.

CFA was applied after EFA and reliability analysis. The goodness of fit values obtained for the scales as a result of CFA are given in Table 4.

The indexes which were observed to determine the fitness of the goodness of the variables were Goodness-of-Fit Index (GFI≥0.85), Root Mean Square Error of Approximation (RMSEA≤0.08), Tucker-Lewis Index (TLI≥0.90) and Comparative Fit Index (CFI≥0.90)

Table 3. Demand stability factor loadings and reliability analysis.

Items	Factor Loadings	Alfa	KMO	Tot. Var. Exp.
DS2: Our customers provide reliable estimates of their own demands.	.884			
DS3: Our customers place their orders according to predetermined order delivery times.	.864			
DS4: Our customers' orders are consistent with their demand estimates, which they previously reported.	.861	0.900	0.849	62.603
DS5: Our customers' orders are in line with our estimates.	.833			
DS6: It is not difficult to estimate the demand volume and order content.	.801			
DS7: Our main production plans are not subject to high demand changes.	.719			
DS8: There are no unexpected changes and fluctuations in our customer demands.	.512			

Table 4. CFA goodness of fit test.

Variable	CMIN	DF	CMIN/DF	GFI	CFI	TLI	RMSA
Supply Chain Agility	26.763	13	2.059	0.935	0.974	0.958	0.078
Firm Performance	28.799	18	1.6	0.943	0.983	0.973	0.074
Demand stability	8.016	5	1.603	0.975	0.993	0.98	0.074

Table 5. Correlation analysis.

	Mean	Standard Deviation	Supply Chain Agility	Demand stability	Financial Performance
Supply Chain Agility	4.1429	.62344	1		
Demand Stability	2.2028	.75803	.331**	1	
Financial Performance	3.9308	.92282	.479**	.528**	1
Customer Performance	4.3946	.61069	.528**	.439**	.642**

which were greater than the criteria and indicated a good fit for the sample (Aksoy 2017, 137). After the EFA, CFA and reliability analyzes, correlation analysis was conducted to measure the relationship between variables. The results of the correlation analysis are shown in Table 5.

Findings

Correlation analysis was calculated to determine the relationships between variables. Correlation analysis results are shown in Table 5.

The correlation analysis results show that there is a positive significant relationship between demand stability and supply chain agility. Similarly, it has been determined that there is a positive significant relationship between firm performance and demand stability. Finally, a moderate positive correlation was found between firm performance and supply chain agility variables at 0.01 significance level.

The kurtosis and skewness values of the variables were examined to understand whether the data were normally distributed. For a normal distribution, the Skewness and Kurtosis values must take place between −2 and +2 (Bayram 2013, 109). The results of the normal distribution test are shown in Table 6.

According to the table, the Skewness and Kurtosis ranges of the scales do not exceed +2 and −2. Therefore, the data set used in the research is distributed normally.

In order to test the hypotheses, a structural equation model was created and analysed firstly. Then the goodness of fit values of the model are shown in Table 7 and the analysis results are shown in Table 8.

After CFA, it was found that the scales provided acceptable goodness of fit values.

Considering the results in Table 8, supply chain agility affects demand stability positively and significantly. The standardised coefficient estimate value was calculated as 0.469. This finding means that if supply chain agility increases by 1 unit, demand stability will increase by 0.469 units. The result of the analysis supports the H2 hypothesis.

Table 6. Normal distribution.

Variable	N	Skewness	Kurtosis
Supply Chain Agility	112	−.367	.136
Demand stability	112	−.229	.494
Firm Performance	112	−.745	.457
Financial Performance	112	−.670	−.048
Customer Performance	112	−.869	.137

Table 7. Structural equation model goodness of fit values.

Variable	CMIN	DF	CMIN/DF	GFI	CFI	TLI	RMSEA
Structural Model	220.147	164	1.342	0.849	0.969	0.961	0.056

Table 8. Results of structural equation model analysis.

Analysed Path			Estimate	Standard Error	Critical Ratio	P
Demand stability	≤	Supply Chain Agility	0.469	0.152	3.085	0.002
Customer Performance	≤	Supply Chain Agility	0.377	0.088	4.281	***
Financial Performance	≤	Supply Chain Agility	0.766	0.158	4.858	***
Customer Performance	≤	Demand stability	0.167	0.054	3.111	0.002
Financial Performance	≤	Demand stability	0.418	0.091	4.593	***

*** p < .001

Table 9. Regression analysis results regarding the mediation test.

Outcome Variables						
		M (Demand stability)			Y (Firm Performance)	
Prediction Variables		b	S.E.		B	S.E.
X (Supply Chain Agility)	a	.056***	.016	c'	.067***	.012
M (Demand stability)	-	-	-	b	.377 ***	.070
Constant	IM	3.823***		IY	3.061***	
		R^2 = .104			R^2 = .443	
		F(1;110) = 12.702; P < .001			F(2;109) = 43.405; P < .001	

*** p < .001

Similarly, supply chain agility affects customer performance and financial performance positively and significantly. The standardised coefficient estimates were found as 0.377 and 0.766, respectively. This finding means that if supply chain agility increases by 1 unit, customer performance will increase by 0.377 and financial performance by 0.766 units. The results of the analysis support the H1a-b hypotheses.

It is also proven that demand stability affects customer performance and financial performance positively and significantly. The standardised coefficient estimates were found to be 0.167 and 0.418, respectively. This finding means that if demand stability increases by 1 unit, customer performance will increase by 0.167 and financial performance by 0.418 units. The results of the analysis support the H3a-b hypotheses.

Process Macro, developed by Hayes (2018) based on the bootstrap method, was used in order to test demand stability's mediating role in the impact of supply chain agility on firm performance.(Table 9).

The analysis results proved that supply chain agility has a significant positive effect on demand stability (B:.056, %95 CI [.087, .025], t:3.564, p < .001). It is understood that the beta value is significant both because the p value is less than 0.001 and the values of the confidence interval do not include the zero value. Agility explains 10.4% of demand stability (R2 = 0.104). Thus, the H2 hypothesis, which is confirmed by the structural model, is once again confirmed by process macro.

In addition, it has been determined that the demand stability has a significant positive effect on firm performance (B:.377, %95 CI [.516, .238], t:5.371, p < .001). Agility also has a meaningful positive impact on firm performance (B:.067, %95 CI [.043, .091], t: 5.481, p < .001). It is understood that the beta value is significant both because the p value is less than 0.001 and the values of the confidence interval do not include the zero value. Demand stability and agility explain 44.3% of the change in new product performance (R2 = 0.443). Unlike the structural model, with this analysis, firm performance is considered as a single variable without being separated into factors, and thus, the effect of both demand stability (H3) and supply chain agility (H1) is determined.

It was found that the indirect effect of agility on firm performance is significant, hence demand stability mediates the relationship between agility and firm performance.

Accordingly, the effect of agility on firm performance is positively significant and demand uncertainty mediates this relationship (B:.021, %95 CI [.008, .038]). A fully standardised effect size (K^2) of 0.13 indicates that the effect is moderate (Gürbüz 2019, s. 64). Thus, H4 was accepted.

The analysis results are also shown on Figure 2 in order to interpret the results of the mediation effect.

To analyse the moderator role of demand stability in the impact of supply chain agility on firm performance, it is necessary to create a new interaction variable by multiplying supply chain agility and demand stability. In order to talk about the moderator effect of demand stability, the interaction variable must significantly

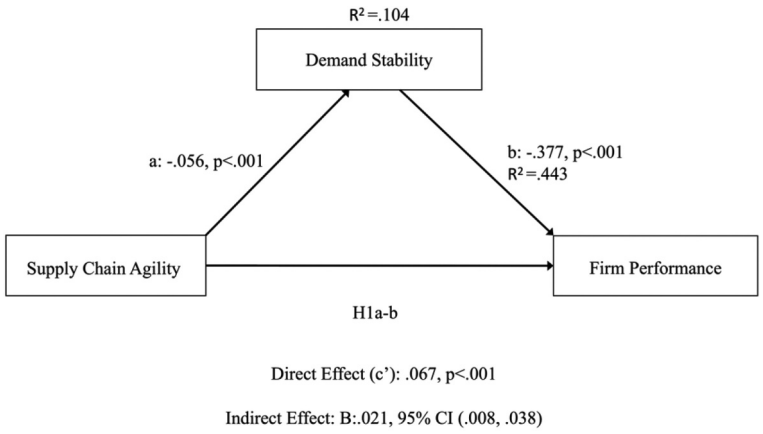

Figure 2. Mediation analysis results.

Table 10. The MODERATOR ROLE OF DEMAND STABILITY.

	Unstand. Coefficients		Stand. Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Fixed)	3.986	.205		19.435	.000
Supply Chain Agility	.005	.006	.028	.797	.427
Demand stability	.133	.009	1.137	15.302	.000
Interaction	.253	.011	1.842	22.979	.000

a. The Dependent Variable: Firm Performance

affect firm performance along with supply chain agility and demand stability. The results are shown in Table 10.

The results of the analysis showed that the demand stability and the interaction variable created had an effect on firm performance. However, the inclusion of the interaction variable in the analysis made the effect of supply chain agility on firm performance meaningless. Thus, it is not possible to talk about the moderator effect of demand stability.

Discussion

The purpose of this study is to search for the effect of supply chain agility on customer performance and financial performance, which are considered as dimensions of firm performance. Furthermore, since the COVID-19 pandemic caused demand uncertainty, the moderating and mediating effect of demand stability in this relationship were analysed. In particular, the COVID-19 pandemic reveals how fast external environmental conditions of the companies' can change and how they need to design their supply chains in order to adapt to such changes. The importance of the study is that it provides guidance to companies on how agile they should design their supply chains under the stability level of demand in order to increase performance.

The findings of the study reveal that companies with an agile supply chain structure performed higher during the COVID-19 pandemic. With the agility of the supply chain, companies gain the ability to estimate and respond to demand changes that may arise as a result of sudden changes and disruptions in the market, as in the pandemic period. Thus, it has been proven that the demand for companies with an agile supply chain during the pandemic will be more stable (H2) and they will show higher company performance (both customer and financial performance) as a result of continuing their processes throughout the supply chain as uninterrupted as possible (H1a-b). These findings approve the first two hypotheses of the study. In our study, it has been determined that there is a positive and significant relationship between demand stability and customer performance (H3a) and financial performance during the pandemic period. This confirms the third hypothesis of the study.

In addition to how supply chain agility will affect firm performance during the pandemic period, how demand stability will mediate this effect and its moderating role in this effect have been studied. And a hypothesis has been established for both the mediating role (H4) and the regulatory effect (H5) accordingly. As a result of the research, it was found that the indirect effect of supply chain agility on firm performance was significant, and therefore demand stability mediated the relationship between agility and firm performance (H4). Thus, the fourth hypothesis of the research was accepted. However, the same cannot be said for the moderating effect. Since the interaction variable created makes the effect of supply chain agility on firm performance meaningless, it can be said that there is no moderating effect (H5). The fifth hypothesis of the study was rejected accordingly.

Conclusion

Our study has shown that companies with an agile supply chain during the pandemic show higher demand stability and thus higher firm performance. For this reason, it is suggested that companies should give more importance to supply chain agility. The result as an agile supply chain improves performance serves also to the localised supply chain idea (3PL Central, 2022). Especially in the COVID-19 period where supply chain disruptions were at the maximum level, a more local SC could increase the agility and so the performance. At the same time, ensuring demand stability will help companies to have a more functional and predictable process by eliminating the effects of possible changes, disruptions and uncertainties throughout the supply chain. In addition, suggestions can be made to companies that this situation will also mediate the increase of firm performance. In addition, for times when demand uncertainty is intense, such as epidemics such as the COVID-19 pandemic or natural disasters, companies will try to maintain demand stability by adopting agile approaches, allowing them to overcome these processes with less damage.

In uncertain environments brought about by many uncertainties such as demand, supply, resource availability situations such as the COVID-19 pandemic, it can be a driving force for businesses to transform their activities into agile (Nakıboğlu 2020, 13). Already during the pandemic period, the components experienced in some areas of the supply chain and not experienced in many areas have clearly revealed it.

Similar to the pandemic period, many problems experienced in the economic and political field in the pre-COVID-19 periods also disrupted the supply chains of companies in similar ways, as in the 1929 economic depression. However, skilled and equipped companies have managed to maintain their supply chains in an agile manner using different strategies. Considering the managerial processes of the companies, it can be said that how agile the supply chains can be in such crisis situations depends entirely on the management strategies. Companies can evaluate similar situations in previous periods and adapt them to their own times or make important predictions for the future. In this, it is recommended to create a business memory and develop business capabilities.

Our study contributed to the COVID-19 and supply chain literature with the finding that supply chain

agility affected firm performance during this period and demand stability mediated this effect which is consistent with previous studies (Um et al. 2017; Güner 2018, p. i). This finding will contribute to production companies that try to keep their production undisrupted under environmental uncertainties such as the COVID-19 pandemic. It is clearly proved that agility in supply chains provides performance. Therefore in unpredictable eras, companies should agile their supply chains to increase performance.

The concept of demand stability is a new concept that has been introduced to the literature on its own from the perspective of quantitative studies. This new concept, which is thought to be the opposite of the demand risk, is recommended to researchers who will work on this subject, with different perspectives and by developing different measurement tools. In addition, since the effect of supply chain agility and firm performance is measured locally, future studies applied on different areas could be compared with our study. This is also a limitation of this study. Because data are collected from one city which makes the study local. Gaziantep is in the first 5 industrialised cities in Turkey. For this reason, the field of study was composed by the production companies located in the Gaziantep organised industrial zone. In addition, since different industries have different requirements, it was not possible to the industrial changes in terms of SCA and COVID-19. Researchers who will study on local SCA might search for the industrial differences existing. Further studies should also consider the bullwhip effect which will also change some indicators. Moreover, as a supply chain, the only flow of material is considered. The flow of cash or information is not considered.

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