

The Role of Agility in the Effect of Trust in Supply Chain on Firm Performance

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Emerging technologies and innovative developments cause the supply chain management to change dramatically. Therefore the subjects regarding trust have become important. Trust established in Supply Chain causes effective relationships among definitive numbers of suppliers in the long-run. The effect of trust in supply chain on firm performance and the contribution of agility to this relation have been supported in the literature. In this research, the role of agility in the effect of trust in supply chain on firm performance will be investigated. According to the results of hypotheses tests, there are positive and significant relations between supply management integration and trust in supply chain, between trust in supply chain and supply chain agility, and between supply chain agility and firm performance.

Keywords: supply management integration, trust in supply chain, supply chain agility, firm performance

Introduction

Over recent years, advanced companies for being afloat and protecting their positions in the competitive markets, have to gain new customers and provide differences against their competitors in increasing competition world. Therefore supply chain has become salient area to work in academic circles. However, it is widely mentioned in the literature that factors affect firm performance.

Since supply management integration touches relationships of supply chain, researchers have argued for integration affect on performance to take into account relationship between supply chain partners (Arnt Buvik, 2015); (Pejvak Oghazi, 2016); (Lin, 2013); (Daniel Prajogo, 2012). In addition to integration factor, some concepts about the relationships such as honesty, trust, and collaboration became essential research topics for supply chain studies. However, researchers focus the relations on trust and integration (Min Zhang, 2013). Although the role of trust element on firm performance through relational structure has been examined (Jury Gualandris, 2015). Researchers also studied for agility affects on firm performance (David M. Gligor C. L., 2015) and furthermore the relations between agility and trust (Yang, 2014).

The paper includes five sections: introduction, background, hypotheses development, research method, and the conclusion. In the background section, we present the literature of supply management integration, trust

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in supply chain, supply chain agility, and firm performance. Furthermore we explained their relations according to our research model in the hypotheses development part. For the research method, we used the structural equation modeling and in the conclusion part we showed analysis results.

Background

Globalization in the business environments, increase in product ranges, and decrease in the product life cycles oblige firms to have strong coordination and strong collaboration with their supply chain partners for being competitive. And thus, researchers study for “supply chain integration approach” (Hau L. Lee, 2001).

The study of Awad and Nassar (2010) defines the supply chain integration as the level of challenges and obstacles in supply chain management (Hussain A.H Awad, 2010). Some studies focus more on supply chain relations in order to examine collaboration effects on supply chain integration and results that show that information technologies and information sharing are significant for supply chain performance (Daniel Prajogo, 2012). Singh and Power (2014) have been defined that firm performance is influenced by knowledge sharing (Prakash J. Singh, 2014).

Alexandru (2014) analysed the effects of technology and planning integration on supply chain management (Alexandru, 2014). Technological innovations and socialization have positive impact on supply chain integration (Lin, 2013). Moreover, independent from technological innovations, the supply chain integration is influenced directly by socialization (Paul D. Cousins, 2006). M.-H. Wang, J.-M. Liu, H.-Q. Wang, W. K. Cheung, and X.-F. Xie (2008) approach to e-supply chain integration with discusses of service coordination problem and agent-mediated decisions (Minhong Wang, 2008). In Palma-Mendoza, Neailey, and Roy's study (2014), they examine the supportability of supply chain integration by business process re-design methodology (Jaime A. Palma-Mendoza, 2014). Pradhan and Routroy (2016) have used Supply Management Integration model in their study to develop supply management performance by working in three phases (Sudeep Kumar Pradhan, 2016). In our research, we used three dimensions of supply management integration by Day, Lichtenstein, and Samouel's study (2015) (Marc Day, 2015).

In the supplier-buyer relationship, face-to-face communications can involve suppliers, improve supplier trust, and furthermore it can also have an effect on performance indirectly (Sonia Ketkar, 2012). Supplier-buyer trust has influence on each other to reach many gains (Jury Gualandris, 2015). Handfield and Bechtel (2002) examined the trust effect on supply chain responsiveness (Robert B. Handfield, 2002). Besides, Ferry Jie (2012) explained the impact of trust along with commitment factor on the lamb retailers' responsiveness (Jie, 2012). In the study of Capaldo and Giannoccaro (2015), trust leads positively to supply chain performance (Antonio Capaldo, 2015). Trust between supply chain partners has affects on commitment (Suh-Yueh Chu, 2006). Based on these studies, researchers define the important role of the trust in supply chain. Fu, Dong, Liu, and Han (2016) have searched the impact of repeated interactions and updated trust on retailer's and agent decision, moreover, their affects on performance of supply chain (Xiao Fu, 2016). Trust has an positive effect on performance. Besides, the role of trust and IT ensure firm to gain competitive advantage (Anil Singh, 2016). Kabra and Ramesh touch on mutual trust on supply chain flexibility (Gaurav Kabra, 2016).

Trust has mediator effects for supply chain project partners to achieve success (Andreas Brinkhoff, 2015).

Besides many studies as mentioned above, researchers have analysed the effect of inter-firm trust on supply chain environmental management by reporting the three important practices: cooperative strategy, cooperation with regulators, and carrots and sticks (Mark P. Sharfman, 2009). Hoejmose, Brammer, and Millington (2012)

achieved trust and management support influence to driving green supply chain management in business to business supply chains (Stefan Hoejmose, 2012). According to Almeida, Marins, Salgado, Santos, and Silva's study (2015), affective trust provides relationships for supply chain partners (Marly Mizue Kaibara de Almeida, 2015).

Trust influences quality of information sharing indirectly (Zhiqiang Wang, 2014). The role of trust in forecast information sharing between supply chain partners has been examined by Özalp, Zheng, and Chen (2011) (Özalp, Zheng, & Chen, 2011). In relation to these studies, Han and Dong (2015), explore that once supplier doesn't fully trust retailers, they don't work with full capacity (Guanghua Han, 2015). Liu, Ke, Wei, and Hua (2015) collected 131 data from manufacturing and service companies from China to search power's and trust's relationships with their own dimensions, moreover their impacts on electronic supply chain management adoption (Hefu Liu W. K., 2015). In addition to Liu et al. (2015)'s study, Cai, Goh, Souza, and Li (2013) collected data from 800 companies which provided by Singapore Logistics Association to define impacts of trust and power on the technical exchange and technology transfer in a supplier-buyer relationship (Shun Cai, 2013). In our study, we used eight dimensions of trust of supplier firm from Doney and Canon's study (1997) (Patricia M. Doney, 1997).

Agility is the key element which supply chain requires for surviving environmental uncertainties when supply chain managements situation is at risk. Agility helps firms deliver right products at just-in-time (Ali Rajabzadeh Ghatari, 2013). The study of Sangari, Razmi, and Zolfaghari (2015) clarifies the key factors to succeed in supply chain agility (Mohamad Sadegh Sangari, 2015). Balaji, Velmurugan, Prapa, and Mythily (2016) put significance of supply chain agility on manufacturing side (M. Balaji, 2016). Braunscheidel and Suresh (2009) defined the influence of market orientation and learning orientation on firm's supply chain agility along with three practices: internal integration, external integration with key suppliers and key customers, and external flexibility by using structural equation modeling (Michael J. Braunscheidel, 2009). Schniederjans, Ozpolat, and Chen (2016), have searched the using of cloud computing affect on collaboration and agility in the humanitarian supply chains (Dara G. Schniederjans, 2016). Gligor, Holcomb, and Feizabadi (2016), searched the relationship between a firm's level of supply chain orientation and firm's level of supply chain agility (David M. Gligor M. C., 2016). Shaw, Burgess, Mattos, and Stec (2005) approach to develop supply chain agility in capital-intensive industries (N. E. Shaw, 2005). Supply chain agility help firms enhance relationship between customer-suppliers (David M. Gligor M. C., 2012). Supply chain agility is important for firms to gain competitive advantage (Kuo-Jui Wu, 2016) (David M. Gligor M. C., 2012). Tuan (2016) researched the relationship between supply chain agility and organisational ambidexterity in the influence of competitive intelligence (Tuan, 2016).

Agility is one of the curicial factors to develop performance of humanitarian supply chain (Gaurav Kabra, 2016).

Firm supply chain agility has influences on firm's financial performance (David M. Gligor C. L., 2015). Moreover, DeGroot and Marx (2013), mentioned the developed supply chain agility influences positively to the firm's financial performance in their study (Sharon E. DeGroot, 2013). Besides, the positive effects of supply chain agility on operational performance have been defined by Blome, Schoenherr, and Rexhausen (Constantin Blome, 2013). In addition to Blome et al.'s study, Eckstein, Goellner, Blome, and Henke explored that supply chain agility and supply chain adaptability have positive impacts on operational performance as well as cost performance (Dominik Eckstein, 2015). Yusuf, Gunasekaran, Musa, Dauda, El-Berishy, and Cang

have explored agility's significant impact on firm to gain higher business performance in oil-gas industry (Yahaya Y. Yusuf, 2014). Based on the above, searching supply chain agility's effect on firm performance, we used seven dimensions by Swafford, Ghosh, and Murthy's study (P. M. Swafford, 2006).

Hypotheses Development

Supply Management Integration and Trust in Supply Chain

Zhang and Huo (2013) have received 617 clear samples from Chinese manufacturing companies for their analysing the effect of trust on SCI along with eight proposed hypotheses (Min Zhang, 2013). As a consequence of this study, they found that positive effect of dependence on trust factor with customers/suppliers and they also found the effect of dependence on customers/suppliers and supply chain integration in indirect and positive ways. Furthermore, they defined customer and supplier integrations to improve financial performances of companies.

H₁: Supply management integration has a positive effect on trust in supply chain

Trust in Supply Chain and Supply Chain Agility

Many studies show that trust is one of the collimating factors in the business relations. Thus, researchers focus on trust affect in the supply chain partners. Since trust plays a critical role in the supplier-buyer relationships as much as dyadic relationships in daily business life, Yang (2014) has searched that effects of information sharing and the trust on suppliers, a firm's technical capability and operational collaboration in supply chain agility on their manufacturers (Yang, 2014). Narayanan, Narasimhan, and Schoenherr (2015) have examined the effect of collaboration on agility performance via trust (Sriram Narayanan, 2015). Narasimhan, Mahapatra, and Arlbjörn (2008) searched that trust effect through supplier-buyer relationship's influence on supplier performance (Ram Narasimhan, 2008).

H₂: Trust in supply chain has a positive effect on supply chain agility

H₃: Trust in supply chain has a positive effect on firm performance

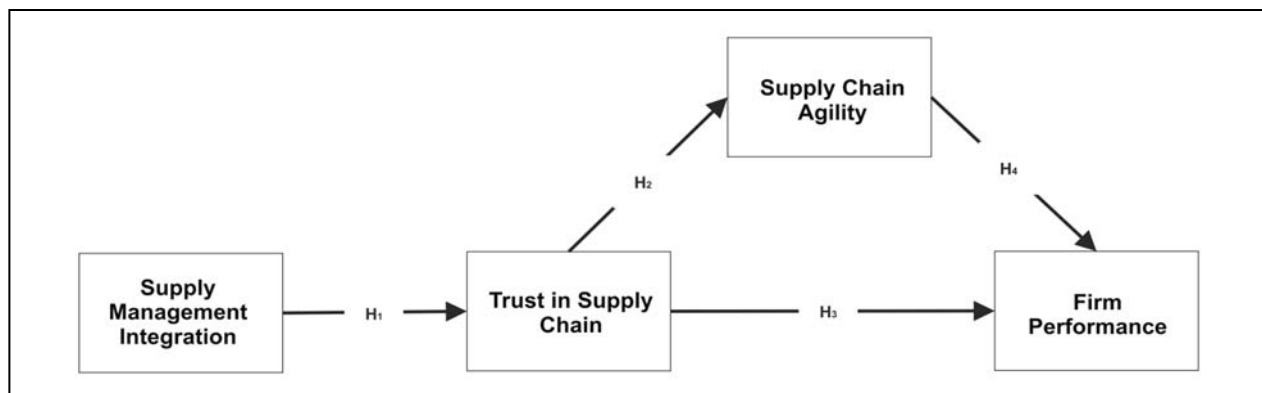


Figure 1. Conceptual model.

Supply Chain Agility and Firm Performance

Supply chain agility is crucial for the firm performance (Hefu Liu W. K., 2013). Ngai, Chau, and Chan (2011) have examined the influence of relationships between supply chain competence and supply chain agility on firm performance (Eric W.T. Ngai, 2011). Since firm performance is influenced by supply chain partners, especially by suppliers, agile supply chain has become important for partners' strategic decisions on firms in

recent years (Chhabi Ram Matawale, 2016). Vickery, Droge, Setia, and Sambamurthy (2010) mentioned that agility has mediator effect on firm performance (S. K. Vickery, 2010). On the other hand, supply chain performance's mediator impact on relationship of agile supply chain strategy and firm performance has been searched by Qrunfleh and Tarafdar (2014) (Sufian Qrunfleh, 2014).

Chan, Ngai, and Moon (2016) have analyzed 141 data from garment manufacturers by using structural equation modeling for achieving the supply chain agility's, strategic and manufacturing flexibility's effects on firm performance (Alan T. L. Chan, 2016).

H₄: Supply chain agility has positive effect on firm performance

Research Method

Measures and Sampling

In order to measure the dimensions of the research model, a questionnaire with Likert-5-scale was formed, including the statements for supply management integration, trust in supply chain, supply chain agility, and firm performance. In the questionnaire, the scale developed by Wisner for supply management integration has been used (Wisner, 2003). The scale developed by Doney and Cannon for trust in supply chain has been used (Doney & Cannon, 1997). The scale developed by Swafford, Ghosh, and Murthy for supply chain agility has been used (Swafford, Ghosh, & Murthy, 2006). In order to measure the firm performance the scale developed by Akgün, Keskin, and Byrne has been used (Akgün, Keskin, & Byrne, 2009). The questionnaire was sent to 358 companies operating in various cities in Turkey and 247 questionnaires were answered. The questions are asked to only one person in each company. Participation of high level managers is promoted since there are statements about firm performance. The distribution of participating companies according to sectors is as follows: 26.7% of participants are working in services, 66.2% and 7.1% are working in agriculture, 35% of the participating firms have more than 250 employees.

Validity and Reliability of the Scales

Confirmatory Factor Analysis (CFA) and reliability analysis have been conducted in order to assess convergent validity of the measures. According to the following CFA fit indices results, the validity of research model is satisfactory level: $\chi^2/DF = 3.614$, CFI = 0.831, IFI = 0.832, RMSEA = 0.103. Confirmatory Factor Analysis results are shown on Table 1 and standardized factor loads of each item are larger than 0.5 and significant. Confirmatory Factor Analysis was performed by AMOS 22 on the scales (Anderson & Gerbing, 1988).

To assess discriminant validity, average variance extracted value is calculated. Results are beyond and close to the threshold level (i.e. 0.5) (Byrne, 2010). Reliability of each construct individually is calculated. Composite reliability and Cronbach α values are beyond and close to the threshold level (i.e. 0.7) (Fornell & Larcker, 1981). Descriptive statistics of the constructs, composite reliabilities, average variance extracted values, Cronbach α values, and Pearson correlation coefficients were shown on Table 2. Additionally the diagonals demonstrate the square root of AVE values of each variable on Table 2.

Test of Hypotheses

In order to test research hypotheses the structural equation modeling (SEM) method has been used. The fit of the model and the data are evaluated according to fit indices. CMIN/DF, CFI (the comparative fit indices), IFI (the incremental fit indices), and RMSA (the root-mean-square error of approximation) are the recognized scales in the literature (Akgün, Ince, Imamoğlu, Keskin, & Kocoğlu, 2014).

Table 1
Confirmatory Factor Analysis Results

Factors	Items	Standardized regression weights	Unstandardized regression weights
Firm Performance	FP35	0.781	1.000
	FP39	0.775	1.095
	FP40	0.745	1.053
	FP41	0.745	1.061
	FP44	0.816	1.136
	FP45	0.753	0.995
	FP46	0.828	1.146
	FP47	0.810	1.097
Supply chain agility	FP50	0.825	1.167
	SCA17	0.527	1.000
	SCA18	0.626	1.192
	SCA19	0.777	1.589
	SCA20	0.693	1.088
	SCA21	0.690	1.168
	SCA22	0.890	1.457
Trust in supply chain	SCA23	0.744	1.416
	TRS29	0.713	1.000
	TRS30	0.734	1.174
	TRS31	0.772	1.186
	TRS32	0.890	1.437
Supply management integration	TRS33	0.830	1.235
	SMI01	0.747	1.000
	SMI02	0.842	1.068
	SMI03	0.532	0.624

Note. $p < 0.01$ for all items.

Table 2
Correlation of the Dimensions

Variables	1	2	3	4	5
Firm performance	(0.746)				
Supply chain agility	0.322	(0.714)			
Trust in supply chain	0.412	0.228	(0.789)		
Supply management integration	0.108	0.181	0.300	(0.718)	
Performance assessment	- 0.042	0.282	0.039	0.172	(0.865)
Cronbach α	0.938	0.870	0.891	0.746	0.780
Composite reliability (CR)	0.942	0.877	0.892	0.756	0.848
Average variance extracted (AVE)	0.557	0.510	0.624	0.516	0.749

Note. $p < 0.01$.

Final model is shown in Figure 2. And the fit indices adequately indicate model fit of the final research model. Results of the hypotheses are shown in Table 3. χ^2/DF value is 3.544 and in the threshold levels (i.e. between 2 and 5). CFI is 0.849 and IFI is 0.850. These values are close to threshold levels (i.e. 0.90). RMSEA is 0.102. This value is close to threshold level (i.e. 0.80) (Byrne, 2010).

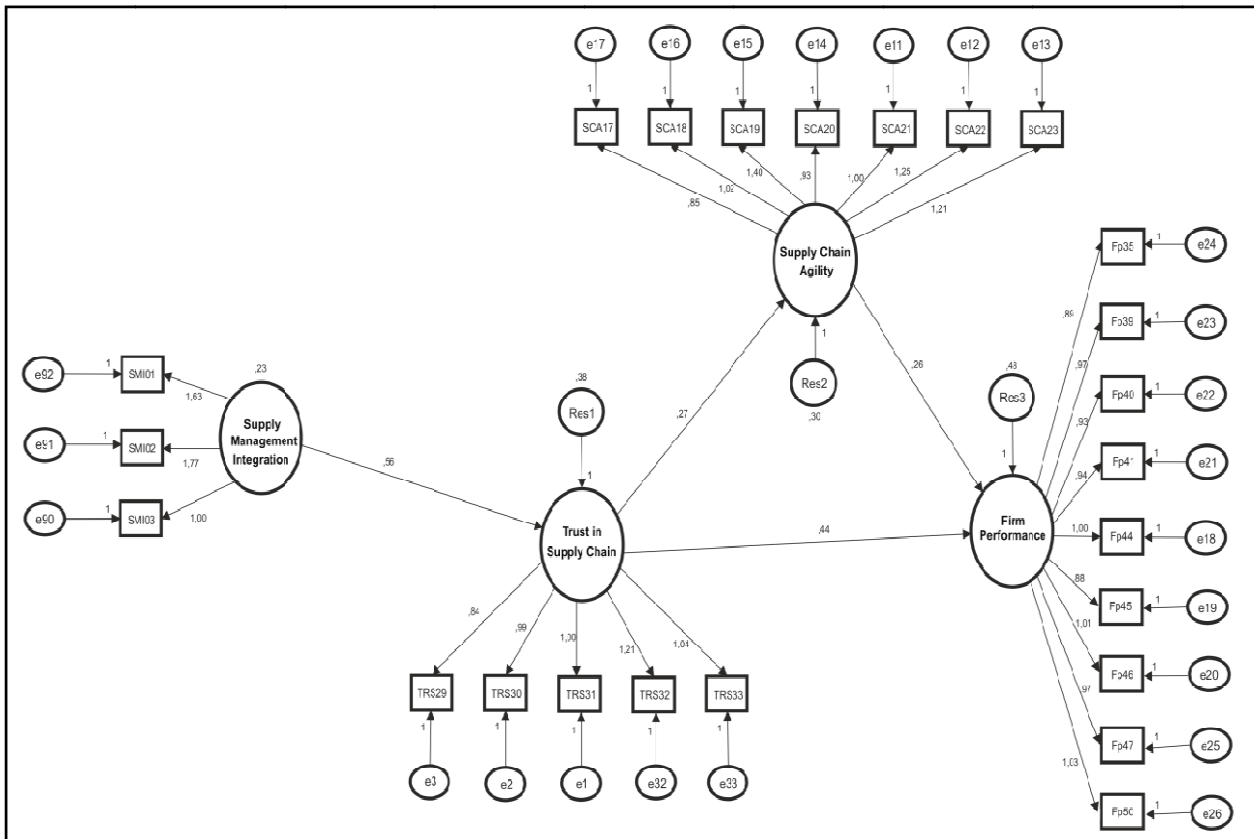


Figure 2. Results of SEM analysis and final model. Note. $\chi^2/DF = 3.544$, CFI = 0.849, IFI = 0.850, RMSEA = 0.102.

As shown in Table 3, H₁, H₂, H₃, and H₄ hypotheses are accepted. These results of hypotheses indicate positive and significant relation between supply management integration and trust in supply chain, relation between trust in supply chain and supply chain agility, and relation between supply chain agility and firm performance.

Table 3

Hypotheses Test Results

Relations	Standard β	<i>p</i>	Result
H ₁ : SMI → TRS	0.403	0.000	Supported
H ₂ : TRS → SCA	0.317	0.000	Supported
H ₃ : TRS → FP	0.379	0.000	Supported
H ₄ : SCA → FP	0.190	0.003	Supported

Conclusion

This paper aimed to empirically investigate the relation among supply management integration, trust in supply chain, supply chain agility, and firm performance. The conducted analysis results showed that supply management integration positively affects trust in supply chain. When firms in supply chain work each other in accord, this facilitates the building of the trust in supply chain. According to the analysis results trust in supply chain positively affects supply chain agility, trust in supply chain causes the firms to make decision quickly. The other results of this analysis are that trust in supply chain positively affects firm performance. Finally, in this analysis, it is indicated that supply chain agility positively affects firm performance. In the excessive

competitive environment, if the firms expedite the decision making processes, firm performance will increase.

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