Yönetim Bilimleri Dergisi/Journal of Administrative Sciences
Cilt / Volume: 15, Sayı / N: 30, ss. / pp.:215-230, 2017

The Effect of Trust in Supply Chain on the Firm Performance through Supply Chain Collaboration and Collaborative Advantage

Nagehan UCA[*]& Murat ÇEMBERCİ[**] &
Mustafa Emre CİVELEK[***] & Huriye YILMAZ[****]

Abstract
Trust in the supply chain leads to an increase in supply chain collaboration (SCC) and subsequently in collaborative advantage (CA) and consequently affects firm performance positively. Supply chain collaboration is an effective collaboration of supply chain partners to succeed in a common goal. Concisely, the collaborative advantage is the relative competitive advantage among companies. It refers to the gathering, exchanging and improving the resources among the collaborating partners. This research aims to clarify the relationship between trust in the supply chain and firm performance through supply chain collaboration and collaborative advantage. Analysis results show that trust in the supply chain positively affects supply chain collaboration. Although the proposed model suggested a positive relationship between trust in the supply chain and collaborative advantage, according to the hypotheses test results, this relation is not statistically significant. This means that trust in the supply chain has no direct effect on the collaborative advantage, but has an indirect effect through supply chain collaboration on the collaborative advantage. Finally, the positive effect of collaborative advantage on firm performance has been found to be statistically significant.
***Key words*:** *Supply Chain Collaboration, Trust in the Supply Chain, Firm Performance, Collaborative Advantage, Structural Equation Modelling*

Tedarik Zincirinde Güven ve Firma Performansı İlişkisinde Tedarik Zincirinde İşbirliği ve İşbirlikçi Avantajın Rolü

Özet
Tedarik zincirinde güven, tedarik zincirinde işbirliği ve sonrasında işbirlikçi avantaj ve sonuç olarak da firma performansı üzerinde pozitif yönde etkiye sahiptir. Tedarik zincirinde işbirliği, Tedarik zinciri partnerlerinin ortak hedeflerinin başarısındaki etkin işbirliğidir. Kısaca, işbirlikçi avantaj şirketler arasındaki göreceli rekabet avantajıdır. İşbirlikçi avantaj, partnerler arasında kaynakların, bir araya getirilmesi, değiş tokuş edilmesi ve geliştirilmesini ifade etmektedir. Bu araştırmanın amacı tedarik zincirinde güven ve firma performansı ilişkisinde tedarik zincirinde işbirliği ve işbirlikçi avantajın rolünü açıklamaktır. Analiz sonuçları

* PhD, Istanbul Commerce University, Faculty of Business Administration, nuca@ticaret.edu.tr
** Asst. Prof., Istanbul Commerce University, Faculty of Business Administration, mcemberci@ticaret.edu.tr
*** PhD, Istanbul Commerce University, Faculty of Business Administration, ecivelek@ticaret.edu.tr
**** Istanbul Commerce University, Graduate School of Social Sciences, hrylmz@yahoo.com

göstermektedir ki tedarik zincirinde güven, tedarik zincirinde işbirliği üzerinde pozitif yönde etki etmektedir. Önerilen modelde tedarik zincirinde güven ile işbirlikçi avantaj arasında pozitif ilişki olduğu öne sürülmesine rağmen hipotez test sonuçlarına göre bu ilişki istatistiksel olarak anlamlı bulunmamıştır. Bu sonuç tedarik zincirinde güvenin işbirlikçi avantaj üzerinde direkt etkisi olmadığını göstermiştir ancak tedarik zincirinde güvenin, tedarik zincirinde işbirliği üzerinden işbirlikçi avantaj üzerine dolaylı etkisi bulunmaktadır. Sonuç olarak işbirlikçi avantajın firma performansına etkisi istatistiksel olarak anlamlı bulunmuştur.

1. INTRODUCTION

Competition, digitalization, and globalization are inevitable in the modern world and companies have to deal with new product development, cost reduction, and customer demands. These realities of doing business require resources, both financial and non-financial alike but sometimes companies lack these resources to compete. It was in the 1990s when supply chain collaboration started to emerge via VMI (Vendor Managed Inventory) and CPFR (Collaborative Planning Forecasting and Replenishment) concepts, it then evolved into planning and other processes through close cooperation with supply chain partners. Wal-Mart and GE (General Electric) are just two examples of major corporations who managed to increase sales and reduce costs by collaborating with their supply chain partners.

It has been researched by Simatupang and Sridharan under which conditions the proposed benefits of cooperation between a company and its suppliers will be realized.[1] Supply chain collaboration affects firm performance positively.[2] Creation of competitive advantage, cost reduction, revenue increase, flexibility, efficiency, the joint competitive advantage (collaborative advantage), new product ideas, better use of market opportunities and meeting customer demands are the most obvious benefits created by supply chain collaboration.[3,4,5,6,7,8,9,10]

1 Simatupang, T. M., and Sridharan, R. The collaboration index:a measure for supply chain collaboration. International Journal of Physical Distribution and Logistics Management, vol 34, no.1, 2004, p. 44-62.

2 Stank, T., Keller, S., and Daugherty, P. Supply chain collaboration and logistical service performance. Journal of Business Logistics vol. 22, 2001, p. 29-48.

3 Lee, H., Padmanabdan, V., and Whang, S. The bullwhip effect in supply chain. Sloan Management Review, Vol. 38, 1997, p. 93-102.

4 Simatupang, T. M., and Sridharan, R. An Integrative Framework for Supply Chain Collaboration. International Journal of Logistics Management vol. 16, 2005, p. 257-274.

5 Kalwani, M., and Narayandas, N. Long term manufacturer-supplier relationships: do they pay? Journal of Marketing, Vol. 59, No.1, 1995, p. 1-15.

6 Robert, B., and Handfield, C. B. The role of trust and relationship structure in improving supply chain responsiveness. International Marketing Management, vol. 31, 2002, p. 367-382.

7 Sheu, C., Yen, H., and Chae, D. Determinants of supplier-retailer collaboration: evidence from an international study. International Journal of Operations and Prodcution Management, vol 26, No.1, 2006, p. 24-49.

8 Nyaga, G., Whipple, J., and Lynch, D. Examining supply chain relationships: do buyer and supplier perspectives on collaborative relationships differ? Journal of Operations Management, Vol. 28, 2010, p. 101-114.

9 Jap, S. Pie expansion efforts: collaboration processes in buyer-supplier relationships. Journal of Marketing Research, Vol. 36, No.4, 1999, p. 461-476

10 Uzzi, B., Social structure and competition in interfirm networks: the paradox of embeddedness. Administrative Science Quarterly Vol. 42, No. 1,1997, p.35–67

Trust is very crucial in every relationship, so it is equally important in supply chain collaboration. Özalp et al. (2011) state that trust increases supply chain collaboration. However, the generation of trust, a crucial concept for positive firm performance and collaboration, is not an easy task.[11]

Long-term relations require trust among partners. Moreover, buyers' trust in suppliers is ensured by official contracts.[12] Ring and Ven (1994) expand on this concept and argue that official contracts will maintain a higher level of trust and create non-official psychological contracts over time.[13]

Supply chain trust leads to supply chain collaboration and collaborative advantage, both of which affect firm performance positively. This study analyses the effect of supply chain trust on firm performance through supply chain collaboration and collaborative advantage with the structural equation model.

2. BACKGROUND

Supply chain collaboration (SCC) is the effective involvement of supply chain partners to attain a common goal.[14] It can also be defined as the joint work of two or more firms for planning and executing supply chain operations to obtain more benefits than they would act by themselves.[15] Lambert et al. explain the concept.[16] As the level of relationship in which risks and benefits are shared among supply chain partners to achieve higher business performance. Another definition of supply chain collaboration is long-term and close partnerships where supply chain members work together and share resources, information and risks for attaining common goals.[17,18] Studies prove that collaborative behaviors affect interdepartmental relationships in a positive way. It has also been proven that collaboration between logistics and marketing departments foster integrated service systems to meet customer demands, providing better distribution performance and higher firm performance in the end.[19]

11 Özalp, Ö., Zheng, Y., and Chen, K.-Y. Trust in Forecast Information Sharing. Management Science, Vol. 57, No. 6, 2011, p. 1111-1137.

12 Handfield, R. B., and Bechtel, C. The role of trust and relationship structure in improving supply chain responsiveness. Industrial Marketing Management Vol. 31, No.1, 2002, p. 367-382.

13 Ring, P., and Ven, A. V. Developmental processes of cooperative interorganizational relationships. Academic Management Review vol. 19, 1994, p. 90-118.

14 Liao, S.-H., and Kuo, F.-I. The Study of Relationships Between The Collaboration For Supply Chain, Supply Chain Capabilities And Firm Performance: A Case Of The Taian'S Tft-Lcd Industry. Int. J. Production Economics, 2014, p. 295-304

15 Simatupang, T. M., and Sridharan, R. The Collaborative Supply Chain. The International Journal of Logistics Management, vol. 13,no. 1, 2002, p. 15-30.

16 Lambert, D. M., Emmelhainz, M. A., and Gardner, J. T. Building Successful Partnrships. Journal of Business Logistics, Vol. 20, No.1, 1999, p. 165-181.

17 Bowersox, D., Closs, D., and Stank, T. How to master cross-enterprise collaboration. Supply Chain Management Review, Vol. 7, 2003, p. 18-27.

18 Golicic, S., Fogginn, J., and Mentzer, J. Relationship magnitude and its role in interorganizational relaitonship structure. Journal of Business Logistics(24), 2003, p. 57-75.

19 Ellinger, A. E., Daugherty, P. J., and Keller, S. B. The Relationship Between Marketing/Logistics Interdepartmental Integration and Performance In U.S. Manufacturing Firms: An Empirical Study. Journal of Business Logistics Vol. 21, 2000, p. 15-16.

Simatupang and Sridharan (2005) define supply chain collaboration as having five dimensions. These are process improvement, information sharing, incentive alignment, decision synchronization and integrated supply chain processes.[20] The detailed literature analysis by Hudnurkar et al. (2014) includes 27 different factors affecting supply chain collaboration.[21]

This paper takes into account seven dimensions explained by the studies of Cagliano, Caniato, & Spina (2003),[22] Sheu, Yen, & Chae (2006)[23] and Angeles and Nath, (2001).[24] These seven dimensions are decision synchronization, information sharing, incentive alignment, goal congruence, collaborative communication, resource sharing, and joint knowledge creation

Simatupang and Sridharan (2005) explain decision synchronization as the processes where supply chain partners plan operations that maximize supply chain planning and benefits[25]. Information sharing means the extent of sharing accurate, complete, confidential and relevant information among supply chain partners.[26,27,28] Incentive alignment represents the mechanism of how benefits, costs, risks, and incentives are shared.[29] Goal congruence can be defined as the degree that the partners in the supply chain can comprehend that their goals have been achieved by accomplishing the supply chain goals.[30] Collaborative communication means the degree of the participants' willingness to communicate in the network.[31] Cao and Zhang (2011) explain resource sharing as investing in the firm's capabilities and assets together with the partners, as well as empowering them. Joint knowledge creation is defined as competency development by the partners' joint work to obtain benefits.[32]

There are many benefits that supply chain collaboration creates for companies. One of these benefits is a collaborative advantage or relative competitive advantage

20 Simatupang, T. M., and Sridharan, R., ibid., p. 257-274.

21 Hudnurkar, M., Jakhar, S., and Rathod, U. Factors affecting collaboration in supply chain: A literature Review. Social and Behavioural Sciences, 2014, p. 189-202.

22 Cagliano, R., Caniato, F., and Spina, G. E-business strategy: how companies are shaping their supply chain through the internet. International Journal of Operations and Production Management, Vol. 23, No.10, 2003 , p. 1142-1162.

23 Sheu, C., Yen, H., ibid., p. 24-49

24 Angeles, R., and Nath, R. Partner congruence in electronic data interchange (EDI) enabled relationships. Journal of Business Logistics, Vol. 22, No. 2, 2001,p. 109-127.

25 Simatupang, T. M., and Sridharan, R., ibid., p. 257-274.

26 Cagliano, R., Caniato, F., and Spina, ibid., p. 1142-1162.

27 Angeles, R., and Nath, R., ibid, p. 109-127.

28 Sheu, C., Yen, H., ibid., p. 24-49

29 Cao, M., and Zhang, Q. Supply chain collaboration: Impact on collaborative advantage and firm performance. Journal of Operations Management. Vol. 29, 2011, p. 163-180

30 Cao, M., and Zhang, Q., İbid., p. 163-180

31 Chakraborty, S., Bhattacharya, S., and Dobrzykowski, D. D. Impact of Supply Collaboration on Value Co-creaiton and Firm Perofrmance:A Healthcase Service Sector Perspective. Procedia Economics and Finance Vol.11, 2014, p. 676-694.

32 Badea, A., Prostean, G., Goncalves, G., and Allaoui, H. Assessing risk factors in collaborative supply chain with the analytic hierarchy process (AHP). Social and Behavioural Sciences, Vol. 124, 2014, p. 114-123.

among companies.[33] This is the common benefits gain of collaborating partners that are created after the resources have been gathered, exchanged and improved.[34] The studies of Cao and Zhang (2010) show that supply chain collaborative advantage directly improves firm performance.[35]

Collaborative advantage has five dimensions; business synergy, process efficiency, innovation, quality, and flexibility. Business synergy means the extent to which supply chain partners put their relevant and complementary resources together with the aim of gaining extraordinary benefits.[36] Ansoff states that this synergy results in more benefits to the resources through physical (production equipment) or non-visible (company culture, technology) assets.[37,38] Process efficiency can be described as the extent of the cost advantage of the collaborative processes in comparison to processes of the competitors.[39] Collective decision making is also a part of process efficiency, which is an indicator of profitability and success. The innovation dimension of collaborative advantage means the extent to which the supply chain partners work jointly to develop new processes, products, and services. Competition has shortened the product life cycles; therefore, companies need to innovate more frequently. Supply chain partners that have good communication can improve their product and process development skills.[40] The fourth dimension of the collaborative advantage concept, quality can be defined as the degree to which supply chain partners jointly develop quality products that in turn create more value for their customers.[41] Flexibility means the extent in which the supply chain network supports the initiation of new services and products required by environmental changes. This dimension can also be called customer responsiveness. Companies that can quickly offer new products and services are expected to have higher profitability and market share.

Trust is explained as the belief by one firm that the exchanging partner will stay away from actions which may result in bad outcomes and engage in actions that create positive outcomes for all partners involved.[42] It comes about when one partner is confident about the trustworthiness and honesty of the exchanging partner.[43]

33 Dyer, J., and Singh, H. The relational view: cooperative strategy and sources of interorganizational competitive advantage. Academy of Management Review. Vol. 23, 1998, p. 660-679.

34 Dyer, J., and Singh, H., ibid., p. 660-679

35 Cao, M., and Zhang, Q., İbid., p. 163-180

36 Cao, M., and Zhang, Q., İbid., p. 163-180

37 Ansoff, H. I. (1988). The New Corporate Strategy. Newyork: Wiley.

38 Itami, H., and Roehl, T. Mobilizing Invisible Assets. (Cambridge: Harvard University Press , 1987).

39 Bagchi, P., & Skjoett-Larsen, T. Supply chain integration: a survey. International Journal of Logistics Management, Vol. 16, No.2, 2005, p. 275-294.

40 Kaufman, A., Wood, C., and Theyel, G. Collaboration and technology linkages: a strategic supplier typology. Stretegic Management Journal, Vol. 21, No.6, 2000, p. 649-663.

41 Li, S., Ragu-Nathan, B., Ragu-Nathan, T., and Rao, S. The impact of supply chain practices on competitive advantage and organizational performance. Omega vol. 34, 2006, p. 107-124.

42 Andersen, J., and Narus, J. A. "A Model of Disuibutor Firm and Manufactitrer Firm Working Partnerships". Journal of Marketing, Vol. 54, 1990, p. 42-58.

43 Morgan, R. M., and Hunt, S. D. The commitment-trust theory of relationship marketing. Journal

Trust is the relationship among both individuals and organizations, and it changes over time influenced by the behaviors of the individual partners. Mayer et al. (1995) explain trust as the belief of one firm that their partners will behave and act in the interest of their firm, even in the absence of control and monitoring.[44]

Trust is explained in two dimensions; benevolence and capability. Benevolence is more closely related to relationships between individuals, and it is not sufficient in and of itself in a business environment in a competitive and global world. It is the capability that is crucial for firms.[45] Studies including input from supply chain managers state that performance capability and relationship commitment capability are given more importance than other factors.[46] The dependent variable in this study is the firm performance. It can be described as how a firm attains its financial goals in comparison to its competitors.[47]

Financial measures and market share criteria have been used to compare organizations in addition to analyzing their behaviors over time.[48] From a management point of view, costs and profits are the most crucial measurements of performance. Efficiency factor follows these two indicators. Drucker states efficiency and effectiveness are the two dimensions of company performance. Market share, return on investment, ROI growth rate, profit margin, increase in sales and market share, competitive position measures are the tools that are used to measure organizational performance in literature. In the 1990's, the scope of performance concept had widened, and additional dimensions of quality, innovation, quality of work life and utilization of inputs were added. Nowadays, the concept includes additional dimensions like market share, social responsibility, employee behavior and product and market leadership. Financial information, internal management operations, employee details, customer values, and innovation, have been used as performance measurement tools in the studies of Magutua et al. (2015).[49] These studies have proven that technology used in supply chain processes affects supply chain strategy and firm performance in a positive way. In this paper, firm performance was measured in one dimension.

Based on the literature information mentioned below, the following hypotheses have been created for analysis. In Figure 1, conceptual model is shown

of Marketing, vol. 58, 1994, p. 20-38.

44 Mayer, R. C., Davis, J. H., and Schoorman, F. D. An Integrative Model of Organizational Trust. The Academy of Managemant Review, 1995, p. 709-734.

45 Fawcett, S. E., Jones, S. L., and Fawcett, A. M. Supply chain rust: the catalyst for collaborative innovation. Business Horizons, Vol. 55, 2012, p. 163-178.

46 Fawcett, S. E., Jones, S. L., and Fawcett, ibid, p. 163-178.

47 Li, S., Ragu-Nathan, B., Ragu-Nathan, T., and Rao, S. ibid., p. 107-124.

48 Çemberci, M. (2012). Tedarik Zinciri Yönetimi Performansının Göstergeleri ve Firma Performansı Üzerine Etkileri: Kavramsal Model Önerisi. İstanbul: Akademi Titiz Yayınları.

49 Magutua, P. O., Adudab, J., and Nyaogac, R. B. Does Supply Chain Technology Moderate the Relationship between Supply Chain Strategies and Firm Performance? Evidence from LargeScale Manufacturing Firms in Kenya. International Strategic Management Review, Vol. 3, 2015, p.43-65.

3. HYPOTHESIS DEVELOPMENT AND CONCEPTUAL MODEL

The research has four hypotheses. Development of the hypotheses are as follows:

3.1 The Relationship between Trust in Supply Chain and Supply Chain Collaboration

A high level of trust generates the motivation for open communication and the will to take risks among partner companies in a buyer–supplier relationship.[50,51] There are many studies suggesting that collaborative relationships depend on relational forms of exchange represented by a high level of trust.[52] Boundaries are fading in supply chains among inter-firm partners due to a high level of trust. Since a high level of trust increases the participation of the parties in is supply chain, the boundaries of the organizations become uncertain. Mutual trust plays an important role for the supply chain collaboration.[5354]

H1: Trust in the supply chain affects supply chain collaboration positively.

3.2 The Effects of Trust in Supply Chain and Supply Chain Collaboration on Collaborative Advantage

The synergy, which is a sub-dimension of collaborative advantage, causes the collaboration between the supply chain partners to produce a total gain.[55] The partners of the supply chain can increase financial benefits by creating quick solutions to the problems arising among the partners while producing innovative products.[56] The capability of partnerships to attain cost savings and decrease repetitive actions by the firms involved in the supply chain is increased.[57] Cooperation among competitors can increase knowledge production and synergy.[58] Partners will gain primary

50 Corsten, D., Kumar N. Do Suppliers Benefit from Collaborative Relationships with Large Retailers? An Empirical Investigation of Efficient Consumer Response Adoption. Journal of Marketing: July 2005, Vol. 69, No. 3, 2005, pp. 80-94.

51 Kwon,G., Suh, T. Trust, commitment and relationships in supply chain management: a path analysis, Supply Chain Management: An International Journal, Vol. 10, No. 1,2005, pp.26 – 33.

52 Kumar, Kuldeep, and Han G. Van Dissel. Sustainable Collaboration: Managing Conflict and Cooperation in Interorganizational Systems. MIS Quarterly, vol. 20, no. 3, 1996, pp. 279–300.

53 Patterson, Kirk A. Grimm, Curtis M., M. Corsi, Thomas, Adopting new technologies for supply chain management, Transportation Research, 2003, 95–121.

54 Wua, I. L., Chuangb, C. H., Hsua, C. H., Information sharing and collaborative behaviors in enabling supply chain performance: A social exchange perspective, International Journal of Production Economics, Vol. 148, 2014, pp. 122-132.

55 Simatupang, T. M., and Sridharan, R., ibid., pp. 257-274.

56 Fisher, M.L.,. What is the right supply chain for your product? Harvard Business Review, Vol. 75, No.2, 1997, pp. 105–116

57 Lambert, D.M., Knemeyer, A.M., Gardener, J.T., Supply chain partnerships: model validation and implementation. Journal of Business Logistics Vol. 25 No. 2, 2004, pp.21–42

58 Lado, A, Boyd, N.G., Hanlon, S.C., Competition cooperation and the search for economic rents: a syncretic model. Academy of Management Review Vol. 22 No.1, 1997, pp. 110-141.

benefits as operational improvements in the short run and an increase in profits and a decrease in the duration of product development processes in the long run.[59]

H2: Supply chain collaboration positively mediates the relationship between trust in the supply chain and collaborative advantage

H3: Supply chain collaboration affects collaborative advantage positively

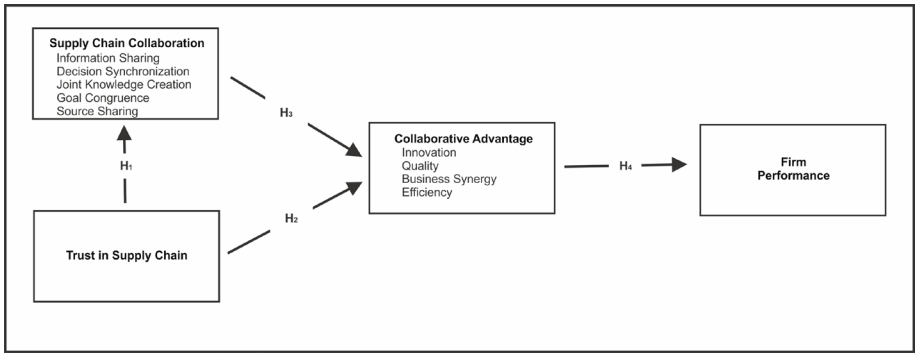
3.3 The Relationship between Collaborative Advantage and Firm Performance

Collaborative advantage has a significant positive effect on firm performance. Researches in literature agree that both customer and supplier firms want to build collaborative relationships with each other.[60,61] Long-term and sustainable relationships with their customers enable the suppliers to reach higher sales and greater returns on their investments.[62] To increase performance, setting up both internal and external collaboration is needed.[63] Collaboration can reduce purchasing costs, increase profitability and increase technical information sharing. [64,65] Thus this study hypothesizes:

H4: Collaborative advantage positively affects firm performance positively

In Figure 1: conceptual model of the research is shown.

Figure 1: *Conceptual Model*



59 Stuart, F.I., McCutcheon, D. Sustaining strategic supplier alliances. International Journal of Operation and Production Management Vol.16, 1996, pp 5-22.

60 Duffy, R., Fearne, A.,The impact of supply chain partnerships on supplier performance. International Journal of Logistics Management Vol. 15 No.1, 2004, pp.57–71.

61 Sheu, C., Yen, H., ibid., pp. 24-49

62 Kalwani, M., and Narayandas, N. ibid. pp. 1-15.

63 Stank, T., Keller, S., and Daugherty, ibid. pp. 29-48.

64 Ailawadi, K.L., Farris, P.W., Parry, M.E., Market share and ROI: observing the effect of unobserved variables. International Journal of Research in Marketing Vol. 16, No.1,1999, pp. 17–33

65 Han, S., Wilson, D.T., Dant, S.P., Buyer supplier relationships today. Industrial Marketing Management, Vol. 22, No. 4, 1993, pp.331–338.

4. RESEARCH METHODS

4.1. Measures and Sampling

A questionnaire with Likert-5-scale which included statements regarding supply chain collaboration, trust in the supply chain, collaborative advantage and firm performance to measure the dimensions of research model was generated. For SCC and CA, the scale developed by Cao and Zhang (2010) was used[66]. For firm performance, Akgün et al.'s (2007) scale[67], which was adapted from Ellinger et al.'s (2002)[68], was also used. To measure trust in the supply chain, a trust scale consisting of 8 questions developed by Doney and Cannon (1997) was used[69].

Of the more than 200 distributed, 150 valid questionnaires were gathered from companies operating in prominent cities throughout Turkey. According to contribution cities, rates are as follows: İstanbul 68%, İzmir 8%, Kocaeli 7%, Tekirdağ 5%, Denizli 5%, Manisa 3%, Bilecik 3%, Diyarbakır 1%. Questionnaires were gathered during the period elapsed between October 2015 to March 2016.

The questions were directed to only 1 person in each company. Since statements about firm performance were included, high-level management participation was encouraged. The distribution of participating companies according to sectors is as follows: 23% of participants are working in services, 20 % chemicals and 16 % FMCG sector. 55 % of the participating firms have more than 150 employees, and 77 % of them have revenue of more than 10 m TL. %84 of the respondents are male, and %66 are female.

4.2. Construct Validity and Reliability

After the data purification process, uni-dimensionality of the construct was assessed.[70] 11 variables were included in the confirmatory factor analysis. To assess convergent validity, confirmatory factor analysis (CFA) was performed by using AMOS 22 on the scales.[71] CFA results indicated that the model was an adequate fit: $\chi 2/DF$ =3.442, CFI=0.716, IFI=0.722, RMSEA= 0.128. CMIN is The Likelihood Ratio Chi-Square Test. The analysis shows the conformity of the initial model and acquired model. A CMIN/DF ratio is very close to a threshold level of 3.[72] Furthermore, other fit indices exceeded their recommended thresholds.

66 Cao, M., & Zhang, Q. Supply chain collaborative advantage: A firm's perspective. International Journal of Production Economics(128), 2010, 358-367.

67 Akgün A.E., Keskin H., Byrne J.C., Aren S., Emotional and learning capability and their impact on product innovativeness and firm performance. Technovation, Vol. 27, No. 9, 2007, pp. 501-513.

68 Ellinger A.D., Ellinger, A.E., Yang B., Howton S.W., The relationship between the learning organization concept and firm's financial performance: an empirical assessment, Human Resource Development Quarterly, Vol. 13, No. 1, 2002, pp. 5-21.

69 Doney, P., & Cannon, J. (1997). An examination of the nature of trust in buyer-seller relationships. Journal of Marketing, 61, 35-61.

70 Fornell, C., and Larcker, D. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. Journal of Marketing Research, Vol. 18, No.1, 1981, p. 39-50.

71 Anderson, J., and Gerbing, D. Structural Equation Modelling in Practice: A Review and Recommended Two-Step Approach. Psychological Bulletin. 1988

72 Bagozzi, R. P., and Yi, Y. Assessing Method Variance in Multitrait-Multimethod Matrices: The

Table 1: *Confirmatory Factor Analysis Results*

Variables	Items	Standardized Factor Loads	Unstandardized Factor Loads
Information Sharing	InfSh1	0.815	0.732
	InfSh 2	0.881	0.894
	InfSh 3	0.849	0.866
	InfSh 4	0.729	1
Decision Synchronization	DecSyn11	0.743	0.817
	DecSyn12	0.890	1.114
	DecSyn13	0.767	0.865
	DecSyn14	0.796	1
Joint Knowledge Creation	JKnwCre31	0.849	0.995
	JKnwCre32	0.885	1.076
	JKnwCre33	0.717	1
Goal Congruence	GCong7	0.724	0.893
	GCong10	0.688	1
Source Sharing	ScrSh24	0.703	0.760
	ScrSh25	0.931	1
Innovation	Inv52	0.879	1.324
	Inv53	0.860	1.345
	Inv54	0.871	1.405
	Inv55	0.668	1
Quality	Qlt48	0.907	0.806
	Qlt49	0.930	0.840
	Qlt50	0.914	1
Business Synergy	BSyr44	0.716	1.035
	BSyr45	0.970	0.501
	BSyr46	0.591	1
Efficiency	Efc37	0.713	1.439
	Efc39	0.673	1
Trust in Supply Chain	TrsSC58	0.539	0.740
	TrsSC60	0.891	1.553
	TrsSC61	0.955	1.554
	TrsSC62	0.696	1
Firm Performance	FrPrf64	0.917	1.380
	FrPrf65	0.672	0.936
	FrPrf66	0.601	0.958
	FrPrf70	0.813	1.386
	FrPrf71	0.510	1

Case of Self-reported Affect and Perceptions at Work. Journal of Applied Psychology, vol. 75, No. 1, 1990, p. 547-560.

Confirmatory Factor Analysis Results are shown in Table 1, and standardized factor loads of each item are larger than 0.5 and significant. These values show the convergent validity of the scales. To assess discriminant validity, average variance extracted (AVE) values were calculated. Results are close to or beyond the threshold level (i.e. 0.5).[73] Reliability of each construct individually calculated. Composite reliability (CR) and Cronbach α values are close to or beyond the threshold level (i.e. 0.7).[74] Descriptive statistics of the constructs, composite reliabilities, average variance extracted values, Cronbach α values and Pearson correlation coefficients are shown in Table 2: Additionally, in Table 2(.) the diagonals demonstrate the square root of AVE values of each variable.

Table 2: *Construct Descriptive, Correlation And Reliability*

Variables	1	2	3	4	5	6	7	8	9	10	11
1.Information Sharing	(.820)										
2.Decision Synchronization	.127	(.801)									
3.Joint Knowledge Creation	.317*	.476*	(.820)								
4.Goal Congruence	.515*	.226*	.538*	(.706)							
5.Source Sharing	.105	.457*	.295*	-.002	(.824)						
6.Innovation	.254*	.368*	.551*	.361*	.014	(.824)					
7.Quality	.520*	.144	.373*	.464*	.136	.335*	(.917)				
8.Business Synergy	.328*	.385*	.383*	.288*	.369*	.296*	.237*	(.775)			
9.Efficiency	.279*	.334*	.535*	.395*	.306*	.455*	.381*	.242*	(.693)		
10.Trust in Supply Chain	.418*	.163*	.307*	.445*	.234*	.218*	.396*	.233*	.501*	(.787)	
11.Firm Performance	.276*	.049	.165*	-.031	.258*	.443*	.246*	.118	.296*	.108	(.717)
Composite reliability	.891	.877	.673	.665	.807	.893	.941	.812	.649	.862	.836
Average variance ext.	.673	.642	.673	.499	.680	.679	.841	.601	.481	.620	.515
Cronbach α	.856	.872	.845	.684	.791	.896	.934	.788	.629	.859	.825

*p < 0.05

Note: Diagonals show the square root of AVEs.

4.3. Test of Hypotheses

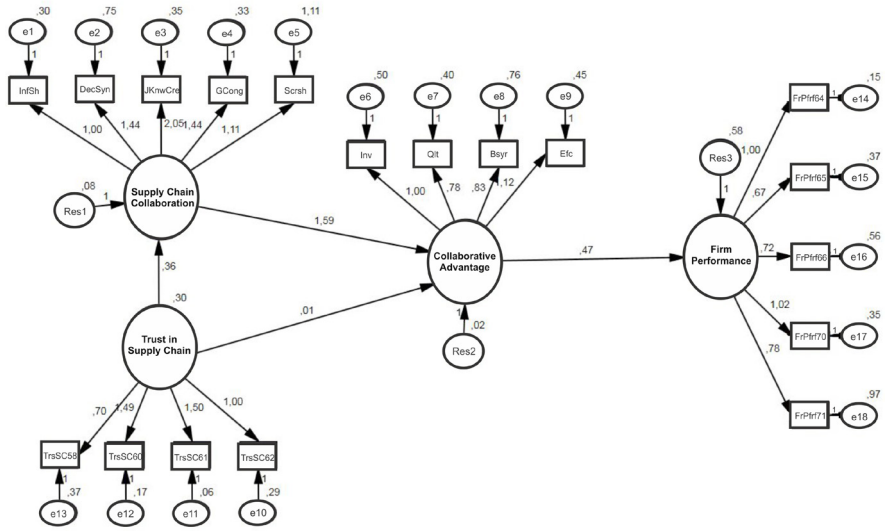
A structural model has been analyzed by using AMOS 23. To test the hypotheses, maximum likelihood estimation methods and the covariance matrix of the items

73 Byrne, B. M. Structural Equation Modeling with AMOS. (New York: Routledge Taylor and Francis Group, 2010).

74 Fornell, C., and Larcker, D. ibid. p. 39-50.

were used. The absolute and relative goodness-of-fit indices of the model were evaluated. In this analysis, the following indices were used: The absolute goodness of fit indices are the root mean square error of approximation (RMSEA) and the χ2 goodness of fit statistic. The relative goodness of fit indices is the comparative fit index (CFI) and the incremental fit index (IFI).

***Figure 2**: Results of SEM Analysis*



As shown in Figure 2, structural model fit indices adequately indicate model fit. χ2/DF value is 2.873 and within threshold levels (i.e. between 2 and 5). CFI and IFI are 0.840 and 0.844 respectively. RMSEA is 0.112.

***Table 3:** Hypotheses Test Results*

Relationships	Model 1	Model 2	Model 3
Trust in Supply Chain → Supply Chain Collaboration		0.538*	0.568*
Trust in Supply Chain → Collaborative Advantage	0.598*		-0.087
Supply Chain Collaboration → Collaborative Advantage			0.974*
Collaborative Advantage → Firm Performance			0.225*
Model fit indices	χ2/df=2.345 CFI=0.946 IFI=0.947 RMSEA=0.095	χ2/df=1.969 CFI=0.966 IFI=0.967 RMSEA=0.081	χ2/df=2.873 CFI=0.840 IFI=0.844 RMSEA=0.112

Note: Path coefficients are standardised

*p < 0.05

As shown in Table 3, when H_1, H_2, H_3, and H_4 are accepted. These results of the hypotheses indicate a positive and significant relationship between trust in the supply chain and supply chain collaboration, between supply chain collaboration and collaborative advantage and between collaborative advantage and firm performance. According to the analysis results, the relationship between trust in the supply chain and the collaborative advantage is not statistically significant. Trust in the supply chain indirectly affects CA through SCC. This indirect effect is found as 0.593. As shown in Table 3, the direct effect of TSC on CA is -0.022. Consequently, according to the analysis results, the total effect was found to be 0.571.

5. CONCLUSION

This paper aimed to empirically investigate the relationship between trust in the supply chain, supply chain collaboration, collaborative advantage, and firm performance.

The H_1 hypothesis suggested that TSC positively affects SCC. According to the analysis result, the H_1 hypothesis has been supported. This result is in concordance with the literature.[75] Lack of trust in the supply chain is a major obstacle of collaboration between firms in the supply chain. Therefore, firms in the supply chain should endeavor to establish a trust to create collaboration.

Although the initial model suggested a positive relationship between trust in supply chain and collaborative advantage, this relation is not statistically significant. This means that trust in the supply chain has no direct effect on the collaborative advantage, but has an indirect effect on collaborative advantage through supply chain collaboration. The mediator role of SCC was found statistically significant. Thus H_2 hypothesis has been supported.

According to the analysis result, the H_3 hypothesis has been supported. Supply chain collaboration positively affects collaborative advantage. Using collaboration created in the supply chain, firms transform this collaboration into an advantage. Finally, collaborative advantage positively affects firm performance. Collaborative advantage consists of innovation, quality and efficiency dimensions. Changes in these dimensions directly affect firm performance. According to Cao and Zhang SCC improves CA and finally affect firm performance[76]. Therefore this result was supported by the current literature. Concisely, firms in the supply chain should build trust to increase collaboration. If this collaboration transforms into an advantage, this advantage will increase the firm performance.

75 Wua, I. L., Chuangb, C. H., Hsua, C. H., ibid. pp. 122-132.

76 Cao, M., and Zhang, Q. ibid. pp. 163-180.

REFERENCES

Ailawadi, K.L., Farris, P.W., Parry, M.E., Market share, and ROI: observing the effect of unobserved variables. International Journal of Research in Marketing. Vol. 16, No.1, 1999, p. 17–33

Akgün A.E., Keskin H., Byrne J.C., Aren S. Emotional and learning capability and their impact on product innovativeness and firm performance. Technovation. Vol. 27, No. 9, 2007, pp. 501-513.

Andersen, J., and Narus, J. A. "A Model of Distributor Firm and Manufacturer Firm Working Partnerships." Journal of Marketing. Vol. 54, 1990, p. 42-58.

Anderson, J., and Gerbing, D. Structural Equation Modelling in Practice: A Review and Recommended Two-Step Approach. Psychological Bulletin. 1988

Angeles, R., and Nath, R. Partner congruence in electronic data interchange (EDI) enabled relationships. Journal of Business Logistics. Vol. 22, No. 2, 2001,p. 109-127.

Ansoff, H. I. (1988). The New Corporate Strategy. Newyork: Wiley.

Badea, A., Prostean, G., Goncalves, G., and Allaoui, H. Assessing risk factors in the collaborative supply chain with the analytic hierarchy process (AHP). Social and Behavioural Sciences. Vol. 124, 2014, p. 114-123.

Bagchi, P., & Skjoett-Larsen, T. Supply chain integration: a survey. International Journal of Logistics Management, Vol. 16, No.2, 2005, p. 275-294.

Bagozzi, R. P., and Yi, Y. Assessing Method Variance in Multitrait-Multimethod Matrices: The Case of Self-reported Affect and Perceptions at Work. Journal of Applied Psychology, vol. 75, No. 1, 1990, p. 547-560.

Bowersox, D., Closs, D., and Stank, T. How to master cross-enterprise collaboration. Supply Chain Management Review, Vol. 7, 2003, p. 18-27.

Byrne, B. M. Structural Equation Modeling with AMOS. (New York: Routledge Taylor and Francis Group, 2010).

Cagliano, R., Caniato, F., and Spina, G. E-business strategy: how companies are shaping their supply chain through the internet. International Journal of Operations and Production Management, Vol. 23, No.10, 2003, p. 1142-1162.

Cao, M., & Zhang, Q. Supply chain collaborative advantage: A firm's perspective. International Journal of Production Economics, Vol. 128, 2010, pp. 358-367.

Cao, M., and Zhang, Q. Supply chain collaboration: Impact on the collaborative advantage and firm performance. Journal of Operations Management. Vol. 29, 2011, p. 163-180.

Chakraborty, S., Bhattacharya, S., and Dobrzykowski, D. D. Impact of Supply Collaboration on Value Co-creation and Firm Performance: A Healthcase Service Sector Perspective. Procedia Economics and Finance Vol.11, 2014, p. 676-694.

Corsten, D., Kumar N. Do Suppliers Benefit from Collaborative Relationships with Large Retailers? An Empirical Investigation of Efficient Consumer Response Adoption. Journal of Marketing: July 2005, Vol. 69, No. 3, 2005, pp. 80-94.

Çemberci, M. (2012). Tedarik Zinciri Yönetimi Performansının Göstergeleri ve Firma Performansı Üzerine Etkileri: Kavramsal Model Önerisi. İstanbul: Akademi Titiz Yayınları.

Doney, P., & Cannon, J. (1997). An examination of the nature of trust in buyer-seller relationships. Journal of Marketing, 61, 35-61.

Duffy, R., Fearne, A., The impact of supply chain partnerships on supplier performance. International Journal of Logistics Management Vol. 15 No.1, 2004, pp.57–71.

Dyer, J., and Singh, H. The relational view: Cooperative strategy and sources of inter-organizational competitive advantage. Academy of Management Review. Vol. 23, 1998, p. 660-679.

Ellinger A.D., Ellinger, A.E., Yang B., Howton S.W., The relationship between the learning organization concept and firm's financial performance: an empirical assessment. Human Resource Development Quarterly. Vol. 13, No. 1, 2002, pp. 5-21.

Ellinger, A. E., Daugherty, P. J., and Keller, S. B. The Relationship Between Marketing/Logistics Interdepartmental Integration and Performance In U.S. Manufacturing Firms: An Empirical Study. Journal of Business Logistics Vol. 21, 2000, p. 15-16.

Fawcett, S. E., Jones, S. L., and Fawcett, A. M. Supply chain rust: the catalyst for collaborative innovation. Business Horizons, Vol. 55, 2012, p. 163-178.

Fisher, M.L., What is the right supply chain for your product? Harvard Business Review, Vol. 75, No.2, 1997, pp. 105–116

Fornell, C., and Larcker, D. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. Journal of Marketing Research, Vol. 18, No.1, 1981, p. 39-50.

Golicic, S., Fogginn, J., and Mentzer, J. Relationship magnitude and its role in inter-organizational relationship structure. Journal of Business Logistics(24), 2003, p. 57-75.

Han, S., Wilson, D.T., Dant, S.P., Buyer supplier relationships today. Industrial Marketing Management Vol. 22, No. 4, 1993, p.331–338.

Handfield, R. B., and Bechtel, C. The role of trust and relationship structure in improving supply chain responsiveness. Industrial Marketing Management Vol. 31, No.1, 2002, p. 367-382.

Hudnurkar, M., Jakhar, S., and Rathod, U. Factors affecting collaboration in the supply chain: A literature Review. Social and Behavioural Sciences, 2014, p. 189-202.

Itami, H., and Roehl, T. Mobilizing Invisible Assets. (Cambridge: Harvard University Press, 1987).

Jap, S. Pie expansion efforts: collaboration processes in buyer-supplier relationships. Journal of Marketing Research, Vol. 36, No.4, 1999, p. 461-476.

Kalwani, M., and Narayandas, N. Long term manufacturer-supplier relationships: do they pay? Journal of Marketing, Vol. 59, No.1, 1995, p. 1-15.

Kaufman, A., Wood, C., and Theyel, G. Collaboration and technology linkages: a strategic supplier typology. Strategic Management Journal, Vol. 21, No.6, 2000, p. 649-663.

Kumar, Kuldeep, and Han G. Van Dissel. Sustainable Collaboration: Managing Conflict and Cooperation in Interorganizational Systems. MIS Quarterly, vol. 20, no. 3, 1996, pp. 279–300.

Kwon, G., Suh, T. Trust, commitment and relationships in supply chain management: a path analysis, Supply Chain Management: An International Journal, Vol. 10, No. 1,2005, pp.26 - 33

Lambert, D. M., Emmelhainz, M. A., and Gardner, J. T. Building Successful Partnerships. Journal of Business Logistics, Vol. 20, No.1, 1999, p. 165-181.

Lambert, D.M., Knemeyer, A.M., Gardener, J.T., Supply chain partnerships: model validation and implementation. Journal of Business Logistics Vol. 25 No. 2, 2004, pp.21–42

Lado, A, Boyd, N.G., Hanlon, S.C., Competition cooperation and the search for economic rents: a syncretic model. Academy of Management Review Vol. 22 No.1, 1997, pp. 110-141.

Lee, H., Padmanabdan, V., and Whang, S. The bullwhip effect in the supply chain. Sloan Management Review, Vol. 38, 1997, p. 93-102.

Li, S., Ragu-Nathan, B., Ragu-Nathan, T., and Rao, S. The impact of supply chain practices on competitive advantage and organizational performance. Omega vol. 34, 2006, p. 107-124.

Liao, S.-H., and Kuo, F.-I. The Study of Relationships Between The Collaboration For Supply Chain, Supply Chain Capabilities And Firm Performance: A Case Of The Taian'S Tft-Lcd İndustry. Int. J. Production Economics, 2014, p. 295-304.

Magutua, P. O., Adudab, J., and Nyaogac, R. B. Does Supply Chain Technology Moderate the Relationship between Supply Chain Strategies and Firm Performance? Evidence from LargeScale Manufacturing Firms in Kenya. International Strategic Management Review, Vol. 3, 2015, p.43-65.

Mayer, R. C., Davis, J. H., and Schoorman, F. D. An Integrative Model of Organizational Trust. The Academy of Management Review, 1995, p. 709-734.
Morgan, R. M., and Hunt, S. D. The commitment-trust theory of relationship marketing. Journal of Marketing, vol. 58, 1994, p. 20-38.
Nyaga, G., Whipple, J., and Lynch, D. Examining supply chain relationships: do buyer and supplier perspectives on collaborative relationships differ? Journal of Operations Management, Vol. 28, 2010, p. 101-114.
Özalp, Ö., Zheng, Y., and Chen, K.-Y. Trust in Forecast Information Sharing. Management Science, Vol. 57, No. 6, 2011, p. 1111-1137.
Patterson, Kirk A. Grimm, Curtis M., M. Corsi. Thomas, Adopting new technologies for supply chain management. Transportation Research, 2003, pp. 95–121.
Ring, P., and Ven, A. V. Developmental processes of cooperative inter-organizational relationships. Academic Management Review vol. 19, 1994, p. 90-118.
Robert, B., and Handfield, C. B. The role of trust and relationship structure in improving supply chain responsiveness. International Marketing Management, vol. 31, 2002, p. 367-382.
Sheu, C., Yen, H., and Chae, D. Determinants of supplier-retailer collaboration: evidence from an international study. International Journal of Operations and Production Management, vol 26, No.1, 2006, p. 24-49.
Simatupang, T. M., and Sridharan, R. The Collaborative Supply Chain. The International Journal of Logistics Management, vol. 13,no. 1, 2002, p. 15-30.
Simatupang, T. M., and Sridharan, R. The collaboration index: a measure for supply chain collaboration. International Journal of Physical Distribution and Logistics Management, vol 34, no.1, 2004, p. 44-62.
Simatupang, T. M., and Sridharan, R. An Integrative Framework for Supply Chain Collaboration. International Journal of Logistics Management vol. 16, 2005, p. 257-274.
Stank, T., Keller, S., and Daugherty, P. Supply chain collaboration and logistical service performance. Journal of Business Logistics vol. 22, 2001, p. 29-48.
Stuart, F.I., McCutcheon, D. Sustaining strategic supplier alliances. International Journal of Operation and Production Management Vol.16, 1996, pp 5-22.
Uzzi, B., Social structure and competition in interfirm networks: the paradox of embeddedness. Administrative Science Quarterly Vol. 42, No. 1,1997, p.35–67
Wua, I. L., Chuangb, C. H., Hsua, C. H., Information sharing and collaborative behaviors in enabling supply chain performance: A social exchange perspective, International Journal of Production Economics, Vol. 148, 2014, pp. 122-132.