

THE IMPACT OF GUANXI ON BULLWHIP EFFECT AND BUSINESS PERFORMANCE IN THE SUPPLY CHAIN: A CASE STUDY ON MANUFACTURING COMPANIES IN ERZURUM PROVINCE¹

TEDARİK ZİNCİRİNDE GUANXI' NİN KIRBAÇ ETKİSİ ÜZERİNDE VE İŞLETME PERFORMANSI ÜZERİNDEKİ ETKİSİNİN ARAŞTIRILMASI: ERZURUM İLİNDE FAALİYET GÖSTEREN ÜRETİM FİRMALARI ÜZERİNE BİR ÇALIŞMA

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ABSTRACT

Bullwhip can be defined as a concept explaining inventory fluctuations or inefficient asset allocations or unneeded and mostly excessive inventory buildup as a result of demand changes as one goes further up to the supply chain. In this case manufacturers often encounter with a decrease in forecast accuracy as the buffer increases between the customer and the manufacturer. Consequently, bullwhip effect drastically harms business performance and inventory management and activities.

Members, actors or partners in any given supply chain should tackle bullwhip effect delicately in order to have high business performance and succeed in what they do. Guanxi can be seen as one of ways or methods to deal with bullwhip effect. The word of Guanxi has a Chinese origin. And Guanxi is a general Chinese term used to describe relationships that may result in the exchanges of the favors or connections that are beneficial for the parties involved. Guanxi can be seen as a remedy for bullwhip effect because; one of the reasons why bullwhip effect occurs is lack of information sharing. And Guanxi necessitates information sharing among partners.

In the light of the notions given above, main purpose of the study is to investigate whether quanxi has an impact on bullwhip effect and business performance and also to find out whether or not bullwhip effect has a negative impact on business performance. 150 manufacturing companies were interviewed by employing face to face questionnaires to satisfy the main purpose of the study. And according to the results Guanxi doesn't have an impact on bullwhip effect but has a positive effect on business performance which means as Guanxi in the supply chain increases manufacturing companies' business performance increases. And also bullwhip effect has a negative impact on business performance which means when bullwhip effect increases business performance decreases. Consequently, in the study it was determined that Guanxi can be employed by firms to increase their business performance. And bullwhip effect should be mitigated to keep business performance at high level.

Key words: Guanxi, Bullwhip Effect, Supply Chain, Business Performance, Manufacturing Companies

ÖZ

Kırbaç etkisi tedarik zincirinde üst kısımlara doğru gidildikçe talepteki değişimler sonucu meydana gelen çoğunlukla gereksiz

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ya da fazla envanter bulundurma, verimsiz kaynak ayırma ya da envanterdeki dalgalanmalar olarak açıklanan bir kavramı ifade eder. Bu durumda üreticiler kendileriyle müşteriler arasında stok arttıkça talep tahminini doğru olarak yapma konusunda sıkıntı ile karşılaşmaktadırlar. Dolayısıyla kırbaç etkisi işletme performansını, envanter yönetimi ve faaliyetlerini ciddi anlamda olumsuz yönde etkilemektedir.

Hangi tedarik zincirinde olursa olsun üyeler, aktörler ya da ortaklar yaptıkları işte başarılı olmak ve yüksek işletme performansına sahip olmak için kırbaç etkisi ile titizlikle mücadele etmelidirler. Guanxi kırbaç etkisi ile mücadele etme yollarından biri olarak düşünülebilir. Guanxi ifadesi Çine'den gelmektedir. Guanxi, ilişkiye dâhil olan ortakların karşılıklı bağlantılar ya da çıkarlarını gözetme ve kollama ile sonuçlanabilecek ilişkileri tanımlamada kullanılan bir terimdir. Guanxi'nin kırbaç etkisiyle mücadelede bir çare olarak görülmesinin sebebi kırbaç etkisini oluşturan nedenlerden birinin yetersiz bilgi paylaşımı olduğu gerçeğidir. Guanxi ortaklar arasında bilgi paylaşımını şart koşmaktadır.

Yukarıda verilen kavramlar ışında bu çalışmanın temel amacının Guanxi'nin kırbaç etkisi ve işletme performansı üzerinde etkiye sahip olup olmadığı ve aynı şekilde kırbaç etkisinin ise işletme performansı üzerinde negatif yönde bir etkiye sahip olup olmadığını araştırmaktır. Çalışmanın bu amacını yerine getirmek için 150 üretim işletmesine anket yapılmıştır. Sonuçlara göre Guanxi'nin kırbaç etkisi üzerinde herhangi bir yönde etkiye sahip olmadığı ancak işletme performansını pozitif yönde etkilediği ve kırbaç etkisinin ise işletme performansı üzerinde negatif bir etkiye sahip olduğu kanısına varılmıştır. Buna göre tedarik zincirindeki ortaklar ya da aktörler Guanxi'yi uygulamalarının kırbaç etkisi üzerinde herhangi bir etkiye sahip olmadığı ancak işletme performansını artırdığı sonucuna ulaşılmıştır. Yine yapılan çalışmaya göre kırbaç etkisi azaldıkça üretim firmalarının sahip olduğu işletme performansının arttığı kanısına ulaşılmıştır. Dolayısıyla çalışmaya göre Guanxi'nin işletme performansını artırmak için kullanılabileceği ve daha iyi bir işletme performansı için kırbaç etkisinin azaltılması gerektiği sonucuna ulaşmak mümkündür.

Anahtar Kelimeler: Guanxi, Kırbaç Etkisi, Tedarik Zinciri, İşletme Performansı, Üretim Firmaları

1. INTRODUCTION

Since there is an increasing pressure on firms to meet customer needs and requirements in a timely fashion it is very vital for a firm to provide customers with needed services and products as soon as possible in order to differentiate itself from its rival. To do that, firms have to hold inventory to meet customer needs on time. But if and when a firm holds inventory the firm has to incur costs related to carrying inventory. Of course there is a need for holding inventory but this need should be aligned with actual customer demands.

Especially if there is close cooperation and integration among supply chain partners from downstream to upstream members won't have to incur extra costs caused by excess and redundant inventory. On the contrary, if there is no close cooperation among supply chain members they can't be aware of each other's activities and capabilities. And this can simply bring about bullwhip phenomenon.

If there is a misinformation and distrust among supply chain partners related to fulfilling orders then retailers will not trust its distributor and order more products than it needs. Because the retailer may think that if it places the exact amount of products it needs the distributor will highly likely send less product than the retailer needs. And the same problem will occur between the distributor and manufacturer namely the distributor will order more products than it needs and there will be excess inventory in the supply chain. And this excess and redundant inventory will travel throughout the whole supply chain causing extra costs for each member affecting their business performance negatively.

There are several ways to mitigate bullwhip effect. And according to the study Guanxi which is a Chinese term can be used to mitigate bullwhip effect. Using two basic rules of Guanxi—and those are control and trust and information sharing- can mitigate bullwhip effect and also enhance business performance.

150 manufacturing companies which are located in Erzurum province were interviewed to examine the effect of Guanxi on business performance and bullwhip effect.

2. BULLWHIP EFFECT

When order to the supplier has more variance than order delivered to the buyer this variance travels towards the upstream in the supply chain as it gets bigger and bigger. And this phenomenon is defined as bullwhip effect (Lee, Padmanabhan, & Whang, 1997a). Bullwhip effect can be shortly defined as redundant or excess inventory travelling stage to stage in the supply chain.

Bullwhip effect has an impact on numerous entities such as retailer stores, manufacturer warehouses, distributor warehouses, plant warehouses. Variance in demand might lead to cost issues such as excess raw materials caused due to unplanned buying by the manufacturer, production expenses, excess warehousing costs, decline in product quality, extra transport costs. There are several reasons why bullwhip effect occurs in a supply chain. One of the most prominent reasons is response delay. The other reason is some people forget part of the order he or she has placed (Akkermans & Voss, 2013). And other common reasons for

bullwhip taking place are demand signal processing, rationing game, order batching and price variations (Lee et al., 1997a).

There are some methods to mitigate bullwhip effect. Some of those are information sharing, inventory status information, use of RFID technology and simplification in manufacturer's activities towards pricing and promotion, planning throughout the whole supply chain, coordination of information sharing, establishing trust among supply chain partners (Cao, Baker, & Schniederjans, 2014).

3. GUANXI

Guanxi has its origin in Chinese. And it means network of relationships which contains obligations to facilitate exchanges of favors among individuals (Xin & Pearce, 1996). Guanxi includes relationship, reciprocity, trust, mutual liabilities, long term commitments based on shared experiences and ideas ((von Weltzien Hoivik, 2007).

There are three basic rules to govern Guanxi among people and organizations. And the first rule is that a person should favor the other based on the level of their relationship. Second rule is that the person should reciprocate the person who has favored him or her already. The last rule is empathy requiring goodwill among people and organizations (C. L. Wang, 2007).

Guanxi is maintained based on a certain culture rather than a contract. According to Chinese culture if a person favors another person former one expects latter one to reciprocate him or her with favor when needed. Otherwise Guanxi cannot be maintained (Qian, Abdur Razzaque, & Ah Keng, 2007). This culture leads to a greater commitment to maintain the relationship among partners and deeper trust (Svensson, 2001). Consequently, Guanxi is a relational form of trust that emphasizes long term agreement. Because Guanxi is a long term and relationship based notion, it is suggested in the study in parallel with the study of Cao et al. (2014) Guanxi should have an effect on long term supplier relationships. In the paper it is also suggested that Guanxi can be used as a tool to mitigate bullwhip effect in a supply chain and help manufacturing companies enhance their business performance because Guanxi requires mutual trust and information sharing among partners in business world.

There are some sub-dimensions or elements of Guanxi which are trust and control and information sharing.

Inter-organizational trust can be defined as a degree of a person's trust for another person in another firm (Zaheer, McEvily, & Perrone, 1998). Inter-organizational trust works often as a management mechanism to reduce opportunism (Heide, 1994; Zaheer et al., 1998). Actually trust is regarded as a foundation of collaboration among partners in a supply chain (Zaheer et al., 1998). For example trust can enhance responsiveness, reduce variance in inventory levels, improve order fulfilling in a timely manner (Kim, 2009). When these benefits of trust are taken into consideration it could be said that trust can be used by firms as a tool to mitigate bullwhip caused by holding excessive or large inventory in a supply chain.

As to control, control is a set of aggregated obligations among managers of a firm which allows them to have a predominant position on common behaviors, attitudes, decisions in a supply chain (Gu, Hung, & Tse, 2008).

It has long been suggested that bullwhip can be mitigated through information sharing which is one of the elements of Guanxi. (Lee, Padmanabhan, & Whang, 1997b). Information sharing between supply chain partners can be about inventory level, sale dates, sales services, and order status and production and delivery schedules. An information sharing activity may occur both in upper and lower stream of a supply chain. Further integration between partners enables members of supply chain to realize consignment planning and replenishment decisions through cooperation with their peers (X. Wang & Disney, 2016). This may also have a positive effect on business performance of relevant firms.

4. BUSINESS PERFORMANCE

In the study business performance can be defined as a sum of business financial performance, market growth and business reputation (Cao et al., 2014). Some people measure business performance based on financial performance such as Return on Assets and Return on Sales, Return on Investment, Profit and Profit growth while others measure it based on Market/customer dimensions such as Market Share and Sales Growth (Ahmad, Mehra, & Pletcher, 2004). Business performance can also be measured based on People development and Preparation for the future although this measurement is not common in the literature (Abreu-Ledón, Luján-García, Garrido-Vega, & Escobar-Pérez, 2018).

Business performance measurement is vital for any business because of the motto stating “if you can’t measure it you can’t manage it”.

Business performance which is paramount for almost any business can be enhanced through Guanxi. Because when partners in a supply chain trust each other Guanxi allows firms to access to high quality, timely information at a lower cost and also it helps them incur less transaction costs and enhance their customer services further. And Guanxi also provides suppliers with more improved and developed operation performance (Lee et al., 1997b).

While Guanxi might have a positive effect on business performance bullwhip effect might have a negative impact on business performance. Because; if there is redundant and excess inventory in any supply chain this won’t only affect firms but it will also affect the supply chain as a whole. And it will cause extra expenses and costs throughout the whole supply chain. Bullwhip effect might also have a negative impact on a firm financially.

5. METHODOLOGY OF THE RESEARCH

5.1. Sample Design

A face to face questionnaire was conducted on manufacturing companies in the scope of the study.

The information about addresses of manufacturing companies and some other related information were obtained from chamber of industry and commerce in Erzurum.

According to the data obtained from the chamber of industry and commerce there are 159 manufacturers registered in the chamber of industry and commerce. 3 of 159 manufacturers didn’t want to answer the questions in the questionnaire, 2 of 159 couldn’t be found in their premises. And 4 questionnaires in the study were cancelled because of having inadequate or incorrect information. So, information obtained from 150 questionnaire forms were evaluated in the study. Therefore, 150 manufacturers in the supply chain were interviewed in total.

The questionnaires were conducted in October. Data collected by means of the questionnaires were analyzed via SPSS 22.0.

5.2. Method of Data Collection

Necessary data for the study were collected by conducting face to face questionnaires on members of manufacturing companies in the study. Main purpose of the study is to determine the effect of Guanxi on bullwhip effect and business performance and is to determine impact of bullwhip effect on business performance of manufacturing companies in Erzurum.

Questionnaires which were conducted on manufacturing companies had 30 questions in total. And 8 of 30 questions were related to the scale of Guanxi in the supply chain in which manufacturing companies are operating, 9 of them were related to the scale of bullwhip effect in the supply chain and 9 of them related to the scale of business performance of manufacturing companies and lastly, 4 of the questions were related to demographic characteristics of manufacturing companies.

Theoretical Background and Research Hypotheses

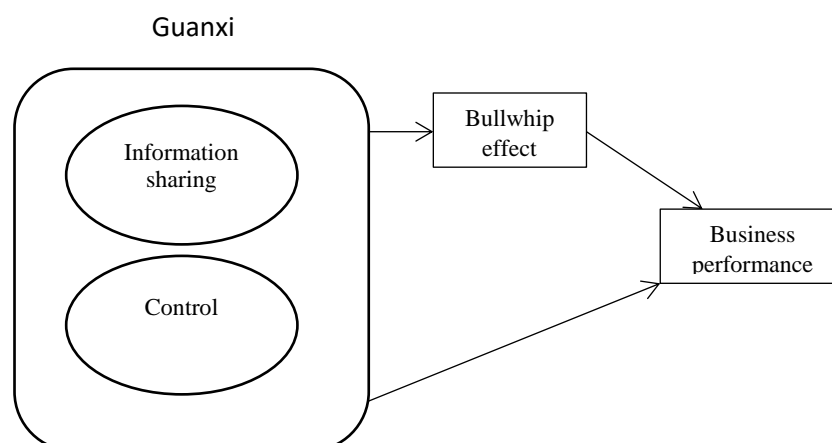


Figure 1 Model of the Study

As shown in Figure 1. Model of the study was formed by tapping into models of two different studies to measure the effect of Guanxi on bullwhip effect and business performance of manufacturing companies in the supply chain. To measure Guanxi among partners in the supply chain, the part of Guanxi dimension in the model was adapted from studies of Cao et al. (2014) and Juan Ding, Jie, A. Parton, and J. Matanda (2014). In the study, Guanxi dimension had two different sub-dimensions that were information sharing which had 4 items and control and trust which had 4 items.

The other part of the model in the study was adapted from study of Cao et al. (2014) to measure bullwhip effect. And dimension of bullwhip effect had 9 items. And the last part of the model in the study was adapted from study of Cao et al. (2014) to measure business performance. And dimension of business performance had 9 items.

Managers or the owners of manufacturing companies were requested to rate the level of Guanxi between them and other partners in the supply chain, and also they were asked to rate the level of bullwhip effect and level of their business performance in a 5-likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

If literature examined There are several studies on the issues of Guanxi, bullwhip effect and business performance.

For example, Cao et al. (2014) has centered their study on Guanxi, bullwhip effect and business performance. They conducted a survey on 205 firms. They used structural equation model to analyze the data. According to their findings guanxi has a positive effect on business performance and it also reduces the bullwhip effect.

Paik and Bagchi (2007) attempted to determine what causes the bullwhip effect. And according to their study six factors i.e. demand forecast updating, order batching, material delays, purchasing delays; information delays and level of echelons contribute to the bullwhip effect.

Hypotheses of this study which were formed in the guidance of other studies as follows;

H₁: Guanxi has a negative effect on bullwhip effect.

H₂: Guanxi has a positive effect on business performance.

H₃: Bullwhip effect has a negative impact on business performance.

5.3. Demographic Characteristics of the Respondents

Manufacturing companies in the supply chain were asked about their demographic characteristics. And their responses are summarized below.

Table 1: Types of Manufacturing Companies

Types of Manufacturing companies	Frequency	Percentage
Furniture	56	37,5
Metal	78	52,0
Chemical and gas	4	2,7
Food and feed	12	8,0
Total	150	100

As seen in Table 1, 52.0 % of manufacturing companies are metal manufacturers, 2.7% of them are chemical and gas producers. Metal manufacturers make up the largest part of total manufacturing companies supply chain while smallest part of the manufacturing companies population belongs to chemical and gas producers.

Table 2: Age of Manufacturing Companies

Age (years)	Types of the companies							
	Furniture		Metal		Chemical and Gas		Food and Feed	
	Fr.*	%	Fr.*	%	Fr.*	%	Fr.*	%
1-4	3	5,4	5	6,4	0	0	0	0
5-8	19	33,9	23	29,5	1	25,0	0	0
9-12	23	41,1	28	35,9	1	25,0	3	25,0
13-16	5	8,9	17	21,8	0	0	3	25,0
17-20	6	10,7	4	5,1	2	50,0	1	8,3
21+	0	0	1	1,3	0	0	5	41,7

Fr.*: Frequency

As seen in Table 2, Most (41, 7%) of food and feed producers have been in manufacturing business for 21+ years, 41,1% of furniture manufacturers, 35,9 % of metal manufacturers have been in manufacturing business for 9 to 12 years and half of (50,0%) chemical and gas producers have been in the manufacturing business for 17 to 20 years.

Table 3: Income of Manufacturing Companies

Monthly Income (Turkish Liras)	Types of the companies							
	Furniture		Metal		Chemical and Gas		Food and Feed	
	Fr.*	%	Fr.*	%	Fr.*	%	Fr.*	%
0-4000	2	3,6	6	7,7	0	0	0	0
4001-8000	22	39,3	18	23,1	1	25,0	0	0,0
8001-12000	25	44,6	39	50,0	2	50,0	3	25,0
12001-16000	5	8,9	11	14,1	0	0,0	3	25,0
16001-18000	1	1,8	2	2,6	0	0,0	0	0,0
18001+	1	1,8	2	2,6	1	25,0	6	50,0

Fr.*: Frequency

As seen in Table 3, most of furniture (44, 6%), metal (50, 0%), chemical and gas (50, 0%) and food and feed (25, 0%) manufacturers monthly earn 8001-12000 Turkish Liras.

Table 4: The numbers of employees work for manufacturing companies

Number of employees	Types of the companies							
	Furniture		Metal		Chemical and Gas		Food and Feed	
	Fr.*	%	Fr.*	%	Fr.*	%	Fr.*	%
1-4	26	46,4	31	39,7	0	0	1	8,3
5-8	23	41,1	31	39,7	1	25,0	0	0
9-12	6	10,7	10	12,8	1	25,0	2	16,7
13-16	1	1,8	6	7,7	2	50,0	2	16,7
17-20	0	0	0	0	0	0	3	25,7
21+	0	0	0	0	0	0	4	2,7

Fr.*: Frequency

Table 4 shows that %46, 4 of furniture manufacturers have 1 to 4 employees, half (50, 0%) of chemical and gas producers have 13 to 16 employees. Among the manufacturing companies, only food and feed producing companies have 21 or more employees.

5.4. Determining the Levels of Guanxi, Bullwhip Effect and Business Performance of Manufacturing Companies in The supply chain

Some questions were directed to manufacturing companies in the supply chain in order to determine the effect of Guanxi on bullwhip effect and business performance and also to assess impact of bullwhip effect on manufacturers' business performance. The answers obtained from the manufacturers in the supply chain are presented below in three different titles.

5.4.1. Determining the Level of Guanxi between Manufacturers and Other supply chain partners

Reliability of the questionnaire was analyzed in order to acquire proper outcomes. And Cronbach's alpha coefficient was used as the reliability measure. According to the analysis, The value of Cronbach's alpha of Guanxi dimension was found to be 0.80 and exceeded 0.60, which indicates acceptable reliability value (Hair Jr, Hult, Ringle, & Sarstedt, 2016). The findings of Guanxi dimension obtained from manufacturing companies in the supply chain are presented in Table 5.

As seen in 4.5, sub-dimensions of Guanxi in the supply chain are information sharing and control and trust.

The lowest mean of Guanxi (4.33) belongs to the food and feed producers in the supply chain. Mean of 4.33 signifies that food and feed producers perceive Guanxi in the supply chain at relatively high level. The highest mean of Guanxi (4.37) belongs to the furniture manufacturing companies in the supply chain. This figure states that furniture manufacturing companies perceive Guanxi in the supply chain at relatively high level.

Table 5: Opinions of Manufacturing Companies about Guanxi in the Supply Chain

Items	Furniture		Metal		Chemical and Gas		Food and Feed		All Manufacturers*	
	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*
Our senior management is able to obtain valuable and important information	4,18	0,39	4,27	0,45	4,25	0,50	4,08	0,29	4,22	0,42
Our trading partners share business knowledge of core business processes with us.	4,48	0,50	4,38	0,59	4,50	0,58	4,25	0,45	4,41	0,55
Our trading partners share proprietary information with us.	4,39	0,49	4,31	0,71	4,00	0,00	4,33	0,89	4,33	0,64
We inform trading partners in advance of our changing needs	4,50	0,51	4,22	0,45	4,25	0,96	4,58	0,52	4,35	0,51
INFORMATION SHARING	4,39	0,20	4,29	0,29	4,25	0,20	4,31	0,30	4,33	0,26
Our senior management is able to obtain government approvals	4,20	0,52	4,24	0,69	4,00	0,00	4,42	0,67	4,23	0,62
Our senior management is able to obtain resources from local authorities	4,36	0,67	4,35	0,68	4,50	0,58	4,25	0,62	4,35	0,67
Our senior management able to obtain financing.	4,39	0,49	4,44	,057	4,50	0,58	4,42	0,52	4,42	0,53
Our senior management has personal relationships with important people (buyers and vendors)	4,52	0,50	4,49	0,50	4,75	0,50	4,33	0,49	4,49	0,50
CONTROL and TRUST	4,37	0,29	4,38	0,27	4,44	0,24	4,35	0,23	4,37	0,27
GENERAL EVALUATION OF GUANXI	4,37	0,17	4,34	0,23	4,34	0,12	4,33	0,19	4,35	0,21

Std.d*: Standard deviation, *1: Strongly disagree, *5: Strongly agree, All manufacturers*: Total mean of Guanxi which belongs to all four manufacturers

If total mean (4.35) of Guanxi in the supply chain which belongs to all four manufacturers, namely furniture, metal, chemical-gas and food-feed manufacturers are considered as a whole, it can be said that all manufacturers in the supply chain perceive Guanxi in the supply chain at relatively high level.

5.4.2. Determining the Level of Bullwhip Effect among Trading Partners in the Supply Chain

According to the analysis, The value of Cronbach's alpha of bullwhip effect dimension was found to be 0.64 and exceeded 0.60, indicating acceptable reliability value (Hair Jr et al., 2016). The findings of bullwhip effect dimension obtained from manufacturing companies in the supply chain are presented in Table 6 above.

According to the Table 6, the lowest mean of bullwhip effect (1.53) belongs to the chemical and gas producers in the supply chain. And this figure asserts that chemical and gas producers perceive bullwhip effect in the supply chain at relatively low level.

The highest mean of bullwhip effect (1.86) belongs to the furniture and also metal manufacturers in the supply chain. This figure means that the furniture and metal manufacturers perceive bullwhip effect in the supply chain at relatively low level.

Table 6 Opinions of Manufacturing Companies about Bullwhip Effect in the Supply Chain

Items	Furniture		Metal		Chemical and Gas		Food and Feed		All Manufacturers*	
	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*
There is shortfall between the amount of materials we order and our supplier sends us.	2,02	0,62	1,83	0,65	1,75	0,50	1,92	0,29	1,91	0,62
When we order needed materials from our supplier the orders accumulate because our supplier doesn't send	2,14	0,90	1,83	0,80	1,25	0,50	2,00	0,00	1,95	0,82

them on time.										
When we order needed materials from our supplier we sometimes realize that materials in transit are inadequate.	20,7	0,97	2,00	0,77	1,25	0,50	1,42	0,52	1,96	0,85
When we order needed materials from our supplier we experience transportation delay.	2,18	0,72	2,32	0,81	1,25	0,50	1,92	0,79	2,21	0,79
We realize the need of materials late. Consequently, we sometimes are not able to order needed materials in a timely manner.	1,88	0,83	2,06	0,76	1,75	0,96	1,92	0,79	1,97	0,79
Our firm doesn't have enough capacity to produce enough amounts of products with desirable specifications.	1,84	0,76	1,73	0,77	1,50	0,58	1,75	0,45	1,77	0,74
Our firm is not able to produce products on time.	1,55	0,57	1,68	0,71	1,75	0,96	1,92	0,67	1,65	0,67
Our firm has a hard time acquiring ordered materials on time.	1,54	0,54	1,59	0,61	1,50	0,58	1,42	0,67	1,55	0,59
There is not ideal number of intermediaries between us, our customers and our suppliers.	1,50	0,54	1,65	0,68	1,75	0,50	1,83	0,84	1,61	0,64
GENERAL EVALUATION OF BULLWHIP EFFECT	1,86	0,36	1,86	0,40	1,53	0,17	1,79	0,14	1,84	0,37

Std.d*: Standard deviation, *1: Strongly disagree, *5: Strongly agree, All manufacturers*: Total mean of bullwhip effect which belongs to all four manufacturers

If total mean (1.84) of bullwhip effect in the supply chain which belongs to all four manufacturers is taken into consideration as a whole, it could be claimed that all manufacturers in the supply chain perceive bullwhip effect in the supply chain at relatively low level.

5.4.3. Determining the Level of Business Performance in the Supply Chain

According to the analysis, The value of Cronbach's alpha of business performance dimension was 0.80 and exceeded 0.60, this situation signifies acceptable reliability value (Hair Jr et al., 2016). The findings of business performance dimension obtained from manufacturing companies in the supply chain are presented in Table 7.

Table 7 shows that, the lowest mean of business performance (3.89) belongs to the metal manufacturers in the supply chain. And this asserts that metal manufacturers perceive their business performance at relatively high level.

The highest mean of business performance (4.19) belongs to the chemical and gas producers in the supply chain. This figure means that chemical and gas producers perceive their business performance at relatively high level.

If total mean (3.96) of business performance in the supply chain which belongs to all four manufacturers is taken into consideration as a whole, it could be stated that all manufacturers in the supply chain perceive their business performance at relatively high level.

Table 7 Opinions of Manufacturing Companies about Their Business Performance in the Supply Chain

Items	Furniture		Metal		Chemical and Gas		Food and Feed		All Manufacturers*	
	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*	Mean	Std.d*
We experience sales growth in our firm.	3,89	0,82	3,73	0,80	4,00	0,00	3,83	0,58	3,81	0,78
We experience revenue growth in our firm.	3,89	0,84	3,81	0,88	4,00	0,00	4,00	0,74	3,86	0,84
MARKET GROWTH	3,89	0,81	3,77	0,82	4,00	0,00	3,92	0,63	3,83	0,79
Return on investment is substantial in our firm.	3,70	0,78	3,60	0,76	4,50	0,58	4,25	0,75	3,71	0,79
Return on sales is substantial in our firm.	3,96	0,60	3,72	0,80	3,75	0,96	4,33	0,78	3,86	0,75
We don't have a liquidity problem in our firm.	3,89	0,76	3,72	0,74	3,75	0,50	3,58	0,79	3,77	0,74
Cash flow in our firm is good enough.	3,61	0,91	3,77	0,91	4,00	0,00	4,08	0,52	3,74	0,88
Our business generates high level of profit.	3,93	0,76	4,03	0,66	4,75	0,50	4,25	0,45	4,03	0,70
FINANCIAL PERFORMANCE	3,82	0,52	3,77	0,52	4,12	0,34	4,10	0,42	3,82	0,52
Our customers are loyal to us.	4,54	0,66	4,35	0,77	4,50	0,57	4,17	0,72	4,41	0,72
We have brand equity.	4,57	0,54	4,33	0,72	4,50	0,58	4,42	0,52	4,43	0,64
COMPANY REPUTATION	4,55	0,46	4,34	0,63	4,50	0,41	4,29	0,50	4,42	0,56
GENERAL EVALUATION OF BUSINESS PERFORMANCE	4,00	0,47	3,89	0,50	4,19	0,23	4,10	0,33	3,96	0,47

Std.d*: Standard deviation, *1: Strongly disagree, *5: Strongly agree, All manufacturers*: Total mean of business performance which belongs to all four manufacturers

4.5. Investigating the Effect of Guanxi on Bullwhip Effect and Business Performance

Simple linear regression analysis was applied to evaluate whether or not Guanxi had an impact on bullwhip effect. For this aim, Guanxi was treated as the independent variable and bullwhip effect as the dependent variable. The results of simple linear regression are summarized in Table 8.

According to the Table 8 Guanxi has no effect on bullwhip effect because $P > 0.05$. Consequently, H_1 is not supported at the 0.05 significance level.

Table 8 the Effect of Guanxi on Bullwhip effect

Independent variable	Unstandardized Coefficients		Standardized Coefficients		t	p	F	R ²	Adjusted R ²
	B	Std. Error ^a	β						
Guanxi*	-0,073	0,148	-0,040		3,344	0,625	0,241	0,002	-0,005
Guanxi**	0,476	0,275	0,229		1,728	0,090	2,986	0,052	0,035
Guanxi***	-0,300	0,197	-0,172		-1,524	0,132	2,322	0,030	0,017
Guanxi****	-0,727	0,840	-0,522		-0,866	0,478	0,750	0,273	-0,091
Guanxi*****	-0,056	0,223	-0,078		-0,249	0,808	0,062	0,006	-0,093

* $P < 0.05$, Guanxi*: Guanxi according to all manufacturing companies in the supply chain, Guanxi**: Guanxi according to furniture manufactureres, Guanxi***: Guanxi according to metals manufacturing companies, Guanxi****: Guanxi according to gas and chemical producing companies, Guanxi*****: Guanxi according to food and feed producing companies, Std. error: Standard error.

Simple linear regression analysis was applied to find out whether guanxi had an effect on business performance. And For this aim Guanxi was treated as the independent variable and business performance considered as the dependent variable. The results of simple linear regression are summarized in Table 9.

Table 9 the Effect of Guanxi on Business Performance

Dependent variable: Business Performance	Unstandardized		Standardized					
	Coefficients		Coefficients					
Independent variable	B	Std. Error ^a	β	t	p	F	R ²	Adjusted R ²
Guanxi*	0,407	0,187	0,176	2,171	0,032	4,715	0,031	0,024
Guanxi**	-0,390	0,362	-0,145	-1,077	0,286	1,160	0,021	0,003
Guanxi***	0,632	0,238	0,291	2,651	0,010	7,026	0,085	0,073
Guanxi****	0,889	1,199	0,464	0,742	0,536	0,550	0,216	-0,176
Guanxi*****	0,189	0,382	0,702	3,113	0,011	9,694	0,492	0,441

P<0.05, Guanxi: Guanxi according to all manufacturing companies in the supply chain, Guanxi**: Guanxi according to furniture manufacturers, Guanxi***: Guanxi according to metals manufacturing companies, Guanxi****: Guanxi according to gas and chemical producing companies, Guanxi*****: Guanxi according to food and feed producing companies, Std. error: Standard error.

Table 9 shows that Guanxi has a significant and positive effect on manufacturing companies' business performance in the supply chain. This asserts that, as Guanxi among supply chain partners increases manufacturing companies' business performance increases too. And according to Table 7, coefficient **B** is 0.407. And this means 1 unit increase in Guanxi among partners in the supply chain leads to a 0,407 unit increase in manufacturing companies' business performance. And also, the equation is significant as a whole and explains 3% of the variance in business performance. Therefore, **H₂** is supported at the 0.05 significance level.

If furniture manufacturers are taken into consideration Guanxi has no effect on furniture manufacturers' business performance because P>0.05.

But, if metals manufacturers are taken into consideration Guanxi has a significant and positive effect on metals manufacturing companies' business performance in the supply chain. This situation means that, as Guanxi between metals manufacturing companies and other supply chain partners increases metals manufacturing companies' business performance increases too. And according to Table 9, coefficient **B** is 0.632 which means 1 unit increase in Guanxi between metals manufacturing companies and other supply chain partners culminates in a 0,632 unit increase in metals manufacturing companies' business performance. And also, the equation is significant as a whole and explains 9% of the variance in business performance.

If chemical and gas producers are considered, Guanxi has no effect on chemical and gas producers' business performance because P>0.05.

And finally, if food and feed producing companies are considered Guanxi has a significant and positive effect on food and feed producing companies' business performance in the supply chain. This signifies that, as Guanxi between food and feed manufacturing companies and other partners of the supply chain increases food and feed manufacturing companies' business performance increases too. And according to Table 9, coefficient **B** is 0.189 which means 1 unit increase in Guanxi between food and feed manufacturing companies and other partners of the supply chain results in a 0,189 unit increase in food and feed manufacturing companies' business performance. And also, the equation is significant as a whole and explains 49% of the variance in business performance.

4.6. Investigating the Impact of Bullwhip effect on Business Performance

Simple linear regression analysis was applied to evaluate if bullwhip effect had an impact on business performance. Bullwhip effect was treated as the independent variable and business performance was considered as the dependent variable in order to evaluate the impact of bullwhip effect on business performance. The results of simple linear regression are summarized in Table 10.

Table 10 the Impact of Bullwhip effect on Business Performance

Dependent variable: Business Performance	Unstandardized Coefficients		Standardized Coefficients					
	B	Std. Error ^a	β	t	p	F	R ²	Adjusted R ²
Bullwhip Effect*	-0,405	0,100	-0,316	-4,050	0,000	16,403	0,100	0,094
Bullwhip Effect**	-0,400	0,168	-0,309	-2,389	0,020	5,707	0,096	0,079
Bullwhip Effect***	-0,381	0,136	-0,306	-2,805	0,006	7,867	0,094	0,082
Bullwhip Effect****	-1,222	0,444	-0,889	-2,750	0,111	7,562	0,791	0,686
Bullwhip Effect*****	-0,527	0,738	-0,222	-0,714	0,492	0,510	0,048	0,047

P<0.05, Bullwhip effect: Bullwhip effect according to all manufacturing companies in the supply chain, Bullwhip effect**: Bullwhip effect according to furniture manufacturers, Bullwhip effect***: Bullwhip effect according to metals manufacturing companies, Bullwhip effect****: Bullwhip effect according to gas and chemical producing companies, Bullwhip effect*****: Bullwhip effect according to food and feed producing companies, Std. error: Standard error.

According to Table 10, it is seen that Bullwhip effect has a significant and negative effect on manufacturing companies' business performance in the supply chain. This signifies that, as bullwhip effect increases manufacturing companies' business performance decreases accordingly. And according to Table 10, coefficient **B** is -0.405. And this figure means 1 unit increase in bullwhip effect leads to a 0.405 unit decrease in manufacturing companies' business performance. And also, the equation is significant as a whole and explains 10% of the variance in business performance. Therefore, **H₃** is supported at the 0.05 significance level.

If and when furniture manufacturers are taken into consideration bullwhip effect has a significant and negative impact on furniture manufacturing companies' business performance in the supply chain. This means that, as bullwhip effect increases furniture manufacturing companies' business performance decreases. And according to Table 10, coefficient **B** is -0,400 which means 1 unit increase in bullwhip effect culminates in a 0,400 unit decrease in furniture manufacturing companies' business performance. And also, the equation is significant as a whole and explains approximately 10% of the variance in business performance.

When metals manufacturers considered bullwhip effect has a significant and negative impact on metals manufacturing companies' business performance in the supply chain. This means that, as bullwhip effect increases metals manufacturing companies' business performance decreases. And according to Table 10, coefficient **B** is -0.381. And this means 1 unit increase in bullwhip effect leads to a 0.381 unit decrease in metals manufacturing companies' business performance. And also, the equation is significant as a whole and explains 9% of the variance in business performance.

But if chemical and gas producers are considered bullwhip effect has no impact on chemical and gas producers' business performance because, $P > 0.05$.

And the same situation goes for the food and feed manufacturing companies, namely; bullwhip effect has no impact on food and feed producers' business performance because, $P > 0.05$.

6. CONCLUSION REMARKS

If demographic characteristics of manufacturing companies located in Erzurum Province are taken into consideration it could be stated that metal manufacturing companies make up the largest population in the supply chain while smallest population belongs to chemical and gas producers.

According to the results of the analyses in the study, Guanxi has no effect on bullwhip effect on contrary to the expectation of the study. Maybe because although manufacturing companies in Erzurum are aware of the importance of Guanxi and implementing it, they order most of components, parts and raw materials from western cities which are far away from Erzurum. Consequently they don't experience bullwhip effect intensively. Because they place an order when they need and the parts and other materials are sent them by providers on time.

Results also show that Guanxi has a positive effect on business performance. And this means as cooperation increases through information sharing, trust and control business performance of manufacturing companies increases as well. And finally, according to the results bullwhip effect has a negative impact on business performance. As bullwhip effect increases business performance of manufacturing companies declines.

In the light of the results it could be suggested that manufacturers should sustain Guanxi and keep bullwhip effect as low as possible to maintain high level of business performance.

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