

The Effects of Information Systems on Supply Chain and Operating Performance - Analysis of the Retail Industry

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Abstract

In this study, researches have been done with the manager of 287 companies operating in Retail Sector in the central Anatolia region of Turkey in order to measure the effects of supply chain management information systems on supplier selection, demand forecasting, supply chain integration, supply chain flexibility and customer satisfaction. With this study where Structural Equation Modeling (AMOS) and SPSS program was used and structural equation model was analyzed It has been determined that the use of information technologies in the supply chain has a positive effect on supplier selection, demand forecasting, supply chain integration, supply chain flexibility and customer satisfaction. The study also contributes to the supply chain literature to improve the supply chain and business performance of information systems, to guide business managers to adopt and implement information technologies and to make investment decisions.

Key Words: Supply chain management, Information systems, Business performance

Biliřim Sistemlerinin Tedarik Zinciri ve İřletme Performansına Etkisinin Perakende Sektöründe İncelenmesi

Öz

Bu alıřmada, Türkiye'nin İ Anadolu bölgesi perakende sektöründe faaliyet gösteren firmaların lojistik birimlerinde görev yapan 287 yöneticiye, tedarik zinciri yönetiminde biliřim sistemlerinin; tedariki seimi, talep tahmini, tedarik zinciri entegrasyonu, tedarik zinciri esneklięi ile müşteri memnuniyeti üzerindeki etkisini ölçen arařtırma yapılmıřtır. Yapısal eřitlik modellemesi (AMOS) ve SPSS programı kullanılarak yapılan alıřmada, kurulan yapısal eřitlik modeli analiz edildikten sonra; tedarik zincirinde biliřim teknolojileri kullanımının tedariki seimi, talep tahmini, tedarik zinciri entegrasyonu, tedarik zinciri esneklięi ile müşteri memnuniyeti üzerine olumlu etkisi olduęu tespit edilmiřtir. alıřma, biliřim sistemlerinin tedarik zinciri ve iřletme performansını artırmasında, iřletme yöneticilerinin bilgi teknolojilerini benimsemesi ve uygulanmasında yatırım kararları almalarında, rehber olması yönünde ayrıca tedarik zinciri literatürüne katkıda bulunmaktadır.

Anahtar Kelimeler: Tedarik zinciri yönetimi, Biliřim sistemleri, İřletme performansı

Atıf İin / Please Cite As:

Sayın, A. A. (2020). The effects of information systems on supply chain and operating performance - analysis of the retail industry. *Manas Sosyal Arařtırmalar Dergisi*, 9(3), 1627-1639.

Geliř Tarihi / Received Date: 25.11.2019

Kabul Tarihi / Accepted Date: 21.04.2020

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Introduction

Supply chain management; it is an approach that captures the synergy of functions and inter-organizational integration and coordination that provides internal and external connections of a business and adopts a customer-focused common vision. The integration mentioned here in; it does not require business combinations or an entity to purchase another business. However, the successful integration of the entire supply chain process, mainly; it depends on the perfect and timely information sharing between the rings in the supply chain. This information sharing is only possible with the effective use of information technologies (Paksoy, & Altıparmak, 2003). One of the aims of supply chain management; requirements of customers and suppliers of materials can be carried out simultaneously with the flow. In order to achieve this goal; From the procurement of materials to the production and distribution stage, all processes in the supply chain must be integrated.

Internet; it ensures the demand for the product, the level of the product, the flow of information about the production plans between the enterprises. Thus, the efficiency of management of supply chain activities increases. In redefining the integration of the supply chain, businesses are benefiting from the Internet, it will provide significant increases in enhancing efficiency and will get the crucial competitive advantage. Businesses with effectively designed distribution systems; they will have important opportunities in gaining competitive advantage as a result of benefiting from the internet in the management of the supply chain. Researchers working in this field; they state that the innovative uses of the internet will continue to increase rapidly in the integration of the supply chain (Yüksel, 2002).

In recent years, with the developments in computer and communication technologies, SCM supported by information technology, in other words, e-procurement is becoming widespread. Enterprises can take advantage of SCM's value creation potential effectively and achieve a stronger competitive advantage (Presutti, 2003). Information technologies that have matured over time in business life, based on more realistic fundamentals and needs; today it provides important benefits to businesses, it seems to provide the monetized and reach the promised level of efficiency. TZY applications, which aim to automate procurement processes, via internet, are also important applications that contribute to this process.

Information is extremely important to the overall performance of the supply chain. Because supply chain managers decide on this basis. Information technologies consist of tools used to gain knowledge awareness. By analyzing this information and acting on this basis, the performance of the supply chain is tried to be improved (Chopra, 2007). The use of information technologies in logistics enterprises also affects the organizational structure of the enterprise. Information technologies; by maximizing organizational flexibility, it supports the development of a transparent organizational structure. The use of information technologies by logistics enterprises improves operational performance indicators; also supports transport, storage and order activities. In addition, by helping the production of value-added services, it provides more than customer expectations and increases customer satisfaction (Drucker, 1988, p. 4).

Thanks to integrated information technologies in the supply chain; activities can be observed and customers can be informed about the activities instantly and they are also available by other trading partners in the information network. With the observability of the supply chain; inventory and information at any time of activities, to reach anywhere. Thus, planners they can intervene in problems and activities at different points in the supply chain.

Information technologies; It can monitor the inventory levels in the supply chain by providing real-time information about open orders, production and activities. It is able to inform the planners in the supply chain by giving them an early decision and reporting the exceptional and changing situations in real time. Simplicity for fast delivery and convenient action; it is easy and quick to control as a support for changing the previous decision or situation. Information technologies to assess the performance of existing relationships; define the required units of measurement and performance objectives, and achieve realistic expectations for future performance (Ross, 2008).

In this section, the previous parts of the study are examined conceptually; The relationship between supply chain activities of information systems use was examined by field work. The study was conducted in the retail sector and the data were analyzed by structural equation modeling. The study is divided into two parts. In the first part; The aim of the study, hypotheses and research model is presented. In this section, which will be used to test hypotheses; data collection method, data collection tool, determination

of sample, statistical methods used in data analysis. In the second part, research data analysis and results are given. Results of the study; is examined with the help of tables and figures were revised results of hypothesis testing.

Method

Model and Hypotheses

Based on the idea of increasing the competitiveness of information systems, it is thought that it will be beneficial to determine the information systems in supply chain management and the level of customer satisfaction. Therefore, information systems in supply chain management, which are described in detail in the theory section; aims to determine the effects of supplier selection, demand estimation, supply chain integration, supply chain flexibility and customer satisfaction. In this respect, the suitability of the causal model; will be tested and the results will be interpreted.

The aim of this study is to investigate the relationship of information systems in supply chain management with supplier selection, demand estimation, supply chain integration, supply chain flexibility and customer satisfaction with the study model presented in Figure 1. In this context, the research was conducted within the framework of the following hypothesis.

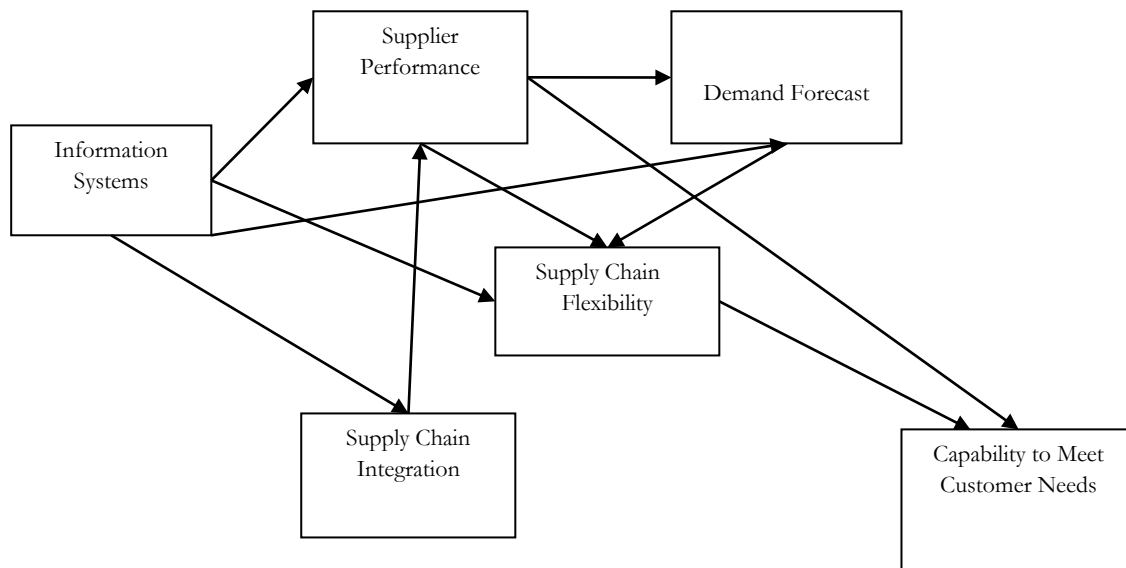


Figure 1. *Conceptual Model of Research*

The following hypotheses are based on the model, which is stated as a result of theoretical study and literature review. The purpose of this model is to test and analyze the results.

H1: There is a positive relationship between the use of information technologies and supplier performance in the supply chain.

Information technologies; thanks to its superiority in the collection, processing and distribution of information, it facilitates the integration of independent supply chain elements. It contributes to the continuous improvement of business activities in terms of cost, time, quality and service, and contributes positively to increase supply chain performance (Papazoglou, & Tsalgatidou, 2000).

H2: There is a positive relationship between the use of information technologies and demand estimation in the supply chain.

These problems, caused by a lack of information, lead to wrong decisions and consequently the loss of trust among the members of the chain. If the chain members do not believe that the sales forecast information is healthy, they try to minimize the operational risks by holding the safety stock in their hands. This leads to surplus stock creation and increase in inventory costs at certain times (Taylor, & Fearnle, 2006).

H3: In the supply chain, there is a positive relationship between the use of information technologies and supply chain integration.

Technology-based barriers affect supply chain integration. In this context, the use of insufficient information systems; It is seen as an important obstacle in the communication between organizations and organizations, in inventory management and in the execution of other logistics activities (Fawcett, & Magnan, 2001).

Factors that impede supply chain integration; supply chain partners lack confidence in one another, lack of supply chain training, lack of joint and strategic plan development capability, flexibility of senior management support, lack of supply chain vision, incompatibility of technologies used by supply chain partners, inability to share information, unwillingness to share risks and rewards with partners, they indicate that there is a lack of performance measurement methods (Ramesh, Banwet, & Shankar, 2010).

Failures in information systems; it can cause great damage to business activities integrated with the advanced level through communication technologies (Chopra, & Sodhi, 2004).

In addition, enterprises should use in-house information systems such as material requirement planning (MRP), manufacturing resource planning (MRPII), distribution resource planning (DRP) and enterprise resource planning (ERP); it is thought that all business functions have an impact on the level of integration as it provides access to the most up-to-date information (Topoyan, 2009).

Another point to consider in the management of supplier relations is; the use of electronic information exchange systems that provide real-time information, and the undeniable contributions to supply chain integration (So, & Sun, 2010).

H4: There is a positive relationship between the use of information technologies and supplier chain flexibility in the supply chain.

It can be shown as an example for companies using information technologies to increase their flexibility in analyzing market developments (Fawcett et al. 2001).

Technological and managerial innovations; information sharing, system integration, in-house coordination, the ability to produce rapid solutions and the company's marketing performance indicators have been shown to affect (Kim, Cavusgil, & Calantone, 2006).

H5: There is a positive relationship between supplier performance and demand forecast in the supply chain.

Supplier performance measurement; It has been observed that determining and eliminating the waste and cost factors increasing the supply chain, decreasing order cycle time and decreasing the inventory level have a positive effect (Gordon, 2005).

H6: There is a positive relationship between supplier performance and supply chain flexibility in the supply chain.

One of the most important variables in increasing the supply chain flexibility is the performance of the suppliers to respond to the needs (Tachizawa, & Gimenez, 2005).

It demonstrates that supplier performance affects supply chain flexibility and customer satisfaction (Avelar, Garcia, & Castrellon, 2014).

Also, the ability of suppliers to meet the requested products; the ability to meet sudden demand changes and deliver products at low cost in small lots is one of the factors affecting supply chain flexibility (Krajewski, Weia, & Tangb, 2005).

H7: In the supply chain, there is a positive relationship between supplier performance and meeting customer needs.

They indicate that the performance of suppliers can increase the ability of the manufacturers to respond to customer needs (Christopher, 2000), (Zhao, Huo, Sun, & Zhao, 2012) and (Suhong, 2002).

It is stated that supplier performance has an effect on customer satisfaction directly (Weissman, 2004).

H8: There is a positive relationship between demand estimation and supply chain flexibility in the supply chain.

A successful demand forecasting process affects supply chain flexibility and customer satisfaction (Krajewski et al. 2005).

According to Gong (2008), rapid changes in demand levels affect the applications of volume flexibility of enterprises.

For this, sharing the demand forecast information with suppliers will provide greater supply chain flexibility (Fawcett et al. 2001).

Having a flexible supply chain provides many advantages such as customer value creation against competitors (eg, distribution, product variety and service) and improving financial performance (eg ROI, ROS). For example, it is very important to create flexible supply chains for products with high demand uncertainty (Vickery, Calantone, & Dröge, 1999).

H9: There is a positive relationship between supply chain integration and supplier performance in the supply chain.

Factors affecting supply chain integration and therefore operational performance; these are classified as obstacles arising from suppliers, internal barriers and barriers from customers (Frohlich, 2002).

Lack of integration between supply chain partners is thought to cause operational inefficiency and decrease in supply chain performance. (Frohlich, & Westbrook, 2001).

H10: There is a positive relationship between supply chain flexibility and meeting customer needs in the supply chain.

Novak and Eppinger (2001) state that supply chain flexibility positively affects customer expectations. Factors such as product availability, status of products, quality of delivery related to supply chain flexibility were positively related to customer satisfaction. (Stank, Goldsby, & Vickery, 1999).

It indicates that there is a positive relationship between supply chain flexibility and customer satisfaction level (Avelar et al. 2014).

As the second of the factors that lead to supply chain flexibility, the pace of responding to customer needs can be demonstrated. Customers expect their needs to be met at any time. Therefore, companies need to respond quickly to the changing needs of customers in order to protect their market share (Duclos, Vokurka, & Lummus, 2003).

Sample

The main mass of the research is composed of executives working in logistics units of firms operating in retail sector in the central Anatolia region. However, only a certain part of these enterprises could be applied to the survey. Therefore, the number of questionnaires subject to the analyzes is 287.

Measurements

The first part of the two-part questionnaire shows the demographic characteristics (age, gender, marital status, education level, duration of work, etc.) of the participant. In the second part, there are propositions that measure the research variables (supply chain management, information systems, supplier selection, demand estimation, supply chain integration, supply chain flexibility and customer satisfaction).

The questions in the second part of the questionnaire were measured with 5 point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree).

The structural equation model (SEM) was used to analyze the regulated model. When analyzed by structural equation modeling, the sample capacity should be at least 200-500. Since the sample size used in this study is 287, the sample size is sufficient. Structural equation modeling and analysis, using AMOS program and other analyzes were performed by using SPSS program.

Scales of the study; Polater's supply chain management and customer satisfaction integration study in 2015, Kim et al. 2006 and Zhao & Stank., 2001 was formed by combining the statements made in their work.

The original scales of the research were sent to specialist academicians and opinions were asked. As a result of the experts' opinions; the validity and reliability of the scales used in the study were tested with the final scales and the validity and reliability of the scales were provided.

Since a subjective evaluation is made in the questionnaires, measurement errors may occur due to the possibility of occurrence rather than the desired situation.

Findings

In this section, the demographic information of the companies is discussed first. Then, the correlation analysis results are presented. Finally, the results of the structural equation modeling analysis to validate the research hypothesis are discussed.

Demographic Features

Table 1. *Demographic Features*

		Frequency	Percent %
Gender	Female	21	7%
	Male	266	93%
	Total	287	100
Education	Primary Education	26	9%
	High School	84	29%
	Associate Degree	43	15%
	Undergraduate	116	40%
	Master Degree	18	6%
	Total	287	100
Working Time	0-3 Years	62	22%
	4-7 Years	102	36%
	8-10 Years	82	29%
	11 years and over	41	14%
	Total	287	100
Logistics Working Time	0-3 Years	43	15%
	4-7 Years	86	30%
	8-10 Years	147	51%
	11 years and over	11	4%
	Total	287	100
Position	Office Bearer	54	19%
	Expert	51	18%
	Manager	167	58%
	Board of Directors	15	5%
	Total	287	100
Age	18-25	74	26%
	26-35	108	38%
	36-45	61	21%
	46 and above	44	15%
	Total	287	100

When we look at the positions of the participants in the enterprise, we see that they are 58% manager, 19% employee, 18% specialist, 15% company partner or business owner. The current positions of the participants indicate that they are competent to answer the questionnaire questions. The fact that the number of managers and experts is high indicates that information was taken from the personnel who managed the operations. When the education levels of the participants are examined; It is observed that it has 9% primary education, 29% high school, 15% associate degree, 40% undergraduate and 6% postgraduate education. The main mass of the research is the retail sector; about three quarters are large, while the rest is medium-sized enterprises.

In the study, survey method was used as data collection tool. A comprehensive literature review was carried out in the form of scales to be included in the questionnaire. The items used in the previous studies were used, and the new scale was added in a similar way. The Cronbach alpha coefficient was calculated to determine the reliability of the scales. According to Özdamar (1999, p. 522) Cronbach Alpha coefficient; It is reliable if it is between 0.40-0.60, it is highly reliable between 0.60-0.80, which means it is highly reliable if it is between 0.80 and 1.00.

The validity and reliability of all scales developed and used in this study were evaluated with the help of confirmatory factor analyzes. The results of the analysis revealed that the scales to be used in testing the hypotheses are valid and reliable scales.

It is necessary to determine that the model is statistically valid before evaluating the relations in the research model with structural equation analysis. In this context, in the first phase of the analysis, it was examined whether the model presented in Figure-1 is statistically significant. In structural equation analysis, when the model is evaluated statistically, a number of criteria should be taken into consideration, in other words, the goodness of fit indexes should be considered. Statistical significance tests (goodness of fit indexes) for structural equation analysis are presented in Table-2. They are also presented with good compliance and acceptable compliance limits. In addition, the values of the calculations made using the AMOS program for the research model are also shown in the Table.

Table 2. Goodness of Fit Index Analysis in Structural Models and Models Own Values

Adaptation Measures and Limits		Research Model
Sufficient	Good	
0.90	≤ NFI ≤ 1.00	0,922
0.95	≤ CFI ≤ 1.00	0,948
0.90	≤ GFI ≤ 1.00	0,837
0.80	≤ AGFI ≤ 1.00	0,794
0.10	> RMSEA > 0.00	0,079
	$\chi^2/df < 3.00$	2,780

Source: Schermelleh-Engel et al. (2003) and Tan et al. (2007).

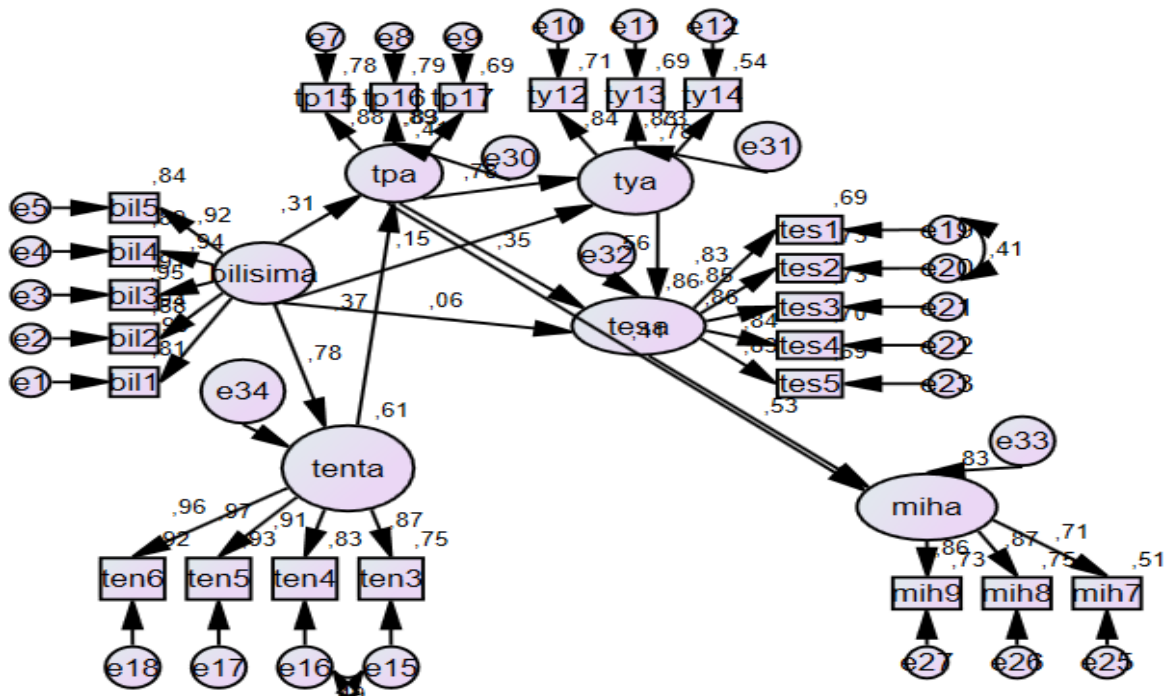


Figure 2. Structural Equation Model

Shortcut Notes in Figure: bilisima= Information Systems, tenta= Supply Chain Integration, tpa= Supplier Performance, ty a= Demand Forecast, tesa= Supply Chain Flexibility, miha= Capability to Meet Customer Needs

Table 3. Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
bil1	<---	bilisima	1,000				
bil2	<---	bilisima	1,151	,043	27,060	***	par_1
bil3	<---	bilisima	1,286	,046	28,172	***	par_2
bil4	<---	bilisima	1,177	,043	27,259	***	par_3
bil5	<---	bilisima	1,165	,046	25,336	***	par_4
tp15	<---	tpa	1,000				
tp16	<---	tpa	1,035	,049	21,248	***	par_5
tp17	<---	tpa	,950	,052	18,287	***	par_6
ty12	<---	tya	1,000				
ty13	<---	tya	,914	,054	17,030	***	par_7
ty14	<---	tya	,917	,067	13,602	***	par_8
ten3	<---	tenta	,941	,037	25,478	***	par_9
ten4	<---	tenta	1,026	,034	30,151	***	par_10
ten5	<---	tenta	1,085	,027	40,047	***	par_11
ten6	<---	tenta	1,000				
tes1	<---	tesa	1,000				
tes2	<---	tesa	1,038	,044	23,375	***	par_12
tes3	<---	tesa	1,024	,058	17,620	***	par_13
tes4	<---	tesa	1,014	,059	17,269	***	par_14
tes5	<---	tesa	,982	,059	16,699	***	par_15
mih7	<---	miha	1,000				
mih8	<---	miha	1,104	,079	13,993	***	par_16
mih9	<---	miha	1,109	,082	13,500	***	par_17

In order to test the supply chain integration and the dimensions of meeting the customer needs, confirmatory factor analysis was performed. As a result of confirmatory factor analysis, it was observed that the model fit values of 5 variables, which are under supply chain integration, were not acceptable. Similarly, the model fit values of 5 variables under the customer requirements were not acceptable. Based on these evaluations, two scale items from both sizes were removed. As a result of the analysis, the proposed modifications have been made and the model fit values after modification are shown in Table-3. In terms of supply chain flexibility, two scale items are considered together because they are similar.

Table 4. Adaptation Measures and Limits

Variables	Adaptation Measures and Limits						Cronbach Alpha Coefficient	Number of Items
	< 5.00 CMI N/df	0.90 ≤ NFI ≤ 1.00 NFI	0.80 ≤ AGFI ≤ 1.00 AGFI	0.90 ≤ GFI ≤ 1.00 GFI	0.95 ≤ CFI ≤ 1.00 CFI	0.10 > RMSEA > 0.00 RMSEA		
Information Systems	1,843	0,998	0,961	0,995	0,999	0,054	0,974	6
Supply Chain Integration	2,925	0,998	0,949	0,994	0,998	0,082	0,915	6
Supplier Performance	-	1	1	1	1	0,080	0,902	3
Demand Forecast	-	1	1	1	1	0,065	0,834	3
Supply Chain Flexibility	2,283	0,996	0,954	0,994	0,998	0,067	0,927	6
Capability to Meet Customer Needs	2,633	0,989	0,946	0,989	0,993	0,076	0,856	5

The scales used in the study were found to be highly reliable according to Cronbach Alpha coefficients.

When the goodness of fit indexes in Table-4 are examined, it can be stated that the fit of the model as a whole is quite good. These results; developed conceptual model shows that the sample size is sufficient for the model and the model is statistically valid and meaningful. Accordingly, the necessity for the model to be a statistically valid model for evaluating the hypotheses claimed in the research model was met.

Conclusion

In this study, the data obtained from 287 executives working in logistics departments of companies operating in retail sector in Central Anatolia region were discussed. In the content of the study; The relationship between information systems, supplier selection, demand estimation, supply chain integration, supply chain flexibility and customer satisfaction in supply chain management has been investigated.

After analyzing the structural equation model; a positive relationship was found between the use of information technologies in the supply chain and supplier performance, a positive relationship between the use of information technologies and demand forecasting, and a positive relationship between the use of information technologies and supply chain integration.

Also; there is a positive relationship between the use of information technologies in the supply chain and the flexibility of the supplier chain, a positive relationship between supplier performance and demand estimation, a positive relationship between supplier performance and supply chain flexibility, and a positive relationship between supplier performance and meeting customer needs.

Finally; there is a positive relationship between demand estimation and supply chain flexibility, a positive relationship between supply chain integration and supplier performance, and a positive relationship between supply chain flexibility and meeting customer needs.

It is seen that supplier performance, which is considered as an intermediary variable, has a positive effect on the effect of the use of information technologies on demand forecasting. Same way; it is seen that the supplier performance used as an intermediary variable in the effect of the use of information technologies on the supply chain flexibility is positive and the demand forecast used as an intermediary variable in the effect of the use of information technologies in the supply chain flexibility has a positive effect.

When the effect rates of intermediary variables are examined, it is seen that they are not very high. As a result of the analyzes made from the interviews, the reasons for not being high are as follows in the form of articles:

- The adaptation of company personnel to information systems is not at the desired level,
- The use of information systems in some companies is low,
- Programs used in information systems; insufficient in providing supplier performance and supply chain flexibility,
- To meet customer needs; more attention should be given to supplier selection and relationships.
- The relationship between suppliers not only in terms of cost, but also in terms of quality and delivery speed should be established.
- Instead of working with a large number of suppliers, companies should prefer to establish long-term and quality-oriented cooperation with a small number of suppliers.
- In order to act in accordance with customer needs, arrangements should be made in operations.
- It is important that information systems are used more effectively in ensuring quality and reporting.

In today's competitive environment, being able to respond to customer demands is a must for companies. The quality of the relationship with the customers plays an important role in meeting the customer demands. In case of a change in the selection of the supplier, the effect on the customer who will use the product should be calculated well. In this way, it will be possible to convert the cost incurred

for supplier change into profitability. For this purpose; should pay more attention to the use of information systems of the companies, establish a regular relationship with their suppliers and customers, receive complaints and changes requests about the systems they use regularly and make operational design decisions by taking these feedbacks into consideration.

The impact of the selected information systems on the supply chain and business performance is not a topic that is mostly discussed in the national literature. Therefore, there is a need for studies on this subject, including conceptual studies. The sample of this study was formed by the enterprises operating in the retail sector. Similar studies can be applied in other sectors. Thus; With the emergence of the systems needed in other sectors, it can contribute to the sustainability of logistics activities. As a result, awareness can be created more efficient and effective use of national resources. Except for a small or medium-sized enterprises, research will be conducted in enterprises operating on an international scale can contribute more to science.

Ethical Declaration

In the writing process of the study titled *“The Effects of Information Systems on Supply Chain and Operating Performance - Analysis of The Retail Industry”*, there were followed the scientific, ethical and the citation rules; was not made any falsification on the collected data and this study was not sent to any other academic media for evaluation.

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TÜRKÇE GENİŞ ÖZET

Bilişim teknolojileri, işletmelerin teknolojik yeniliklere uyum sağlamasında ve örgütlerin rekabet gücünün artmasında önemli etkilere sahip olmaktadır. Bunun yanında işletmeler rakiplerine karşı yarışı tedarik zincirleri üzerinden yapmaktadırlar. İşletme faaliyetlerinin çoğalmasi ile birlikte, işlemler karmaşık hale gelmekte, bunun altından kalkabilmek için kolaylaştırıcı yöntemlerden biri olan bilişim teknolojileri önemli hale gelmektedir.

Bu çalışmada bilişim teknolojileri kullanımının işletmelerin ve tedarik zinciri performansına etkisini; firmaların tedarikçi seçiminde, talep tahmininde, tedarik zinciri entegrasyonunda, tedarik zinciri esnekliğı ile müşteri memnuniyeti üzerindeki ilişkisi ortaya konulmuştur. Araştırmada, Türkiye'nin iç anadolu bölgesi perakende sektöründe faaliyet gösteren firmaların lojistik birimlerinde görev yapan yöneticilere veri toplama aracı olarak anket yöntemi kullanılmıştır. Anket formunda yer alacak ölçeklerin oluşturulmasında, kapsamlı bir literatür incelemesi yürütülmüştür. Önceki çalışmalarda kullanılan maddelerden yararlanılmış, benzer şekilde derecelendirilerek yeni ölçek ilave edilmiştir. Ölçeklerin güvenilirliğini belirlemek için Cronbach alfa katsayısı hesaplanmıştır. Özdamar'a (1999: 522) göre Cronbach Alfa katsayısı; 0.40-0.60 arasında olursa güvenilir, 0.60-0.80 arasında olması oldukça güvenilir, eğer 0.80- 1.00 arasında olursa yüksek derecede güvenilir olduğu anlamına gelmektedir.

Araştırmanın orijinal ölçekleri, uzman akademisyenlere gönderilerek ve görüş istenmiştir. Uzmanların görüşleri neticesinde, araştırmada kullanılan ölçeklerin geçerlilik ve güvenilirliği ölçeklerin son hali ile test edilmiş ve ölçeklerin geçerlik ve güvenilirliği en az 0.8'in üzerinde olduğu görülerek, tüm ölçeklerin güvenilir olduğu tespit edilmiştir.

Değişkenlere uygulanan faktör analizi ve modifikasyonlar neticesinde, bilişim sistemleri değişkeninin altı faktör, tedarik zinciri entegrasyonunun altı faktör, tedarikçi performansı değişkeninin üç faktör, talep tahmini değişkeninin üç faktör, tedarik zinciri esnekliğı değişkeninin altı faktör, müşteri ihtiyaçlarını karşılama değişkeninin beş faktör altında incelenebileceği ortaya konulmuştur.

Hipotezler, kuramsal çalışma ve literatür taraması neticesinde belirtilen, model temel alınarak kurgulanmıştır. Araştırmada oluşturulan kavramsal model ile ilgili on hipotez aşağıda yer almaktadır:

H1: Tedarik zincirinde bilişim teknolojileri kullanımı ile tedarikçi performansı arasında pozitif bir ilişki vardır.

H2: Tedarik zincirinde bilişim teknolojileri kullanımı ile talep tahmini arasında pozitif bir ilişki vardır.

H3: Tedarik zincirinde bilişim teknolojileri kullanımı ile tedarik zinciri entegrasyonu arasında pozitif bir ilişki vardır.

H4: Tedarik zincirinde bilişim teknolojileri kullanımı ile tedarikçi zinciri esnekliği arasında pozitif bir ilişki vardır.

H5: Tedarik zincirinde tedarikçi performansı ile talep tahmini arasında pozitif bir ilişki vardır.

H6: Tedarik zincirinde tedarikçi performansı ile tedarik zinciri esnekliği arasında pozitif bir ilişki vardır.

H7: Tedarik zincirinde tedarikçi performansı ile müşteri ihtiyaçlarını karşılama arasında pozitif bir ilişki vardır.

H8: Tedarik zincirinde talep tahmini ile tedarik zinciri esnekliği arasında pozitif bir ilişki vardır.

H9: Tedarik zincirinde tedarik zinciri entegrasyonu ile tedarikçi performansı arasında pozitif bir ilişki vardır.

H10: Tedarik zincirinde tedarik zinciri esnekliği ile müşteri ihtiyaçlarını karşılama arasında pozitif bir ilişki vardır.

Düzenlenen modeli analiz etmek için yapısal eşitlik modeli (YEM) kullanılmıştır. Yapısal eşitlik modellemesi ile analiz edildiğinde, numune kapasitesi en az 200-500 arasında olmalıdır. Bu çalışmada kullanılan örneklem büyüklüğü 287 olduğundan, örneklem miktarı yeterlidir. Yapısal eşitlik modellemesi ve analizi, AMOS programı kullanılarak ve diğer analizler SPSS programı kullanılarak yapılmıştır.

Uyum iyiliği indeksleri incelendiğinde, modelin uyumunun bir bütün olarak oldukça iyi derecede olduğu ifade edilebilir. Bu sonuçlar; geliştirilen kavramsal modelin veri ile uyum gösterdiği, örneklem büyüklüğünün model için yeterli olduğu ve modelin istatistiksel olarak geçerli ve anlamlı olduğunu göstermektedir. Buna göre, araştırma modelinde iddia edilen hipotezlerin değerlendirilmesi için modelin istatistiksel olarak geçerli bir model olması zorunluluğu karşılanmıştır.

Kurulan yapısal eşitlik modeli analiz edildikten sonra; tedarik zincirinde bilişim teknolojileri kullanımı ile tedarikçi performansı arasında pozitif bir ilişki, bilişim teknolojileri kullanımı ile talep tahmini arasında pozitif bir ilişki, bilişim teknolojileri kullanımı ile tedarik zinciri entegrasyonu arasında pozitif bir ilişki doğrulanmıştır.

Ayrıca; tedarik zincirinde bilişim teknolojileri kullanımı ile tedarikçi zinciri esnekliği arasında pozitif bir ilişki, tedarikçi performansı ile talep tahmini arasında pozitif bir ilişki, tedarikçi performansı ile tedarik zinciri esnekliği arasında pozitif bir ilişki, tedarikçi performansı ile müşteri ihtiyaçlarını karşılama arasında pozitif bir ilişki olduğu görülmüştür.

Son olarak; tedarik zincirinde talep tahmini ile tedarik zinciri esnekliği arasında pozitif bir ilişki, tedarik zinciri entegrasyonu ile tedarikçi performansı arasında pozitif bir ilişki, tedarik zinciri esnekliği ile müşteri ihtiyaçlarını karşılama arasında pozitif bir ilişki olduğu tespit edilmiştir.

Bilişim teknolojileri kullanımının talep tahminine etkisinde aracı değişken olarak ele alınan tedarikçi performansının olumlu etkisi olduğu görülmektedir. Aynı şekilde bilişim teknolojileri kullanımının tedarik zinciri esnekliğine etkisinde aracı değişken olarak kullanılan tedarikçi performansının olumlu, bilişim teknolojileri kullanımının tedarik zinciri esnekliğine etkisinde aracı değişken olarak kullanılan talep tahmininin olumlu etkisi olduğu görülmektedir.

Bunun yanında aracı değişkenlerin etki oranlarına bakıldığında çok yüksek olmadığı görülmektedir.

Araştırma konusu olarak seçilen bilişim sistemlerinin tedarik zinciri ve işletme performansına etkisi ulusal literatürde çoğunlukla ele alınan bir konu değildir. Bu nedenle kavramsal çalışmalar dahil bu konuda yapılacak çalışmalara ihtiyaç bulunmaktadır. Bu çalışmanın örneklemini perakende sektöründe faaliyet

gösteren işletmeler oluşturmuştur. Benzer çalışmalar diğerk sektörlerde de uygulanabilir. Böylelikle diğerk sektörlerde ihtiyaç duyulan sistemlerin ortaya çıkması ile lojistik faaliyetlerinin sürdürülebilirliğine katkı sağlanarak, ulusal kaynakların daha etkin ve etkili kullanılması konusunda bilinç oluşturulabilir. Küçük veya orta ölçekli işletmeler dışında, uluslararası ölçekte faaliyet gösteren işletmelerde yapılacak arařtırmalar alana daha fazla katkı sağlayabilir.